

Community-Based Natural Resource Management in Asia

**Papers Presented at an
International Development
Research Centre (IDRC)
Workshop**

**Hue University of Agriculture
and Forestry, Vietnam
May, 1997**

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May, 1998

Foreword

In May of 1997, the Hue University of Agriculture and Forestry in Vietnam hosted a meeting of the Community-Based Natural Resource Management (CBNRM) Program Initiative of Canada's International Development Research Centre (IDRC). The meeting participants, key research partners of the initiative in Asia, presented interim results of IDRC-supported projects. This informal workshop provided significant input into the development of the CBNRM program and more specifically the creation of a three-year prospectus.

These papers represent a collection of "works-in-progress" and are not peer reviewed academic publications. During the workshop, most participants were working in English as their third or fourth language and they were asked to make verbal and written contributions in English despite their own concerns about linguistic competence. We feel these papers should be shared with a broader audience because of the widely expressed interest in the topic of community-based natural resource management.

This workshop was the first time that most of the IDRC-supported researchers in the region had a chance to meet each other. They clearly stated that sharing their experiences and lessons learned was the most beneficial aspect of the workshop; the benefit to the IDRC program on community-based natural resource management in Asia (CBNRM) was immeasurable.

The IDRC's CBNRM program team members would like to thank the Hue University of Agriculture and Forestry, in particular Mr. Le Van An and our own team member Dr. John Graham, for a masterful job in organizing and hosting the workshop. We would also like to thank Dr. C. Devendra, Dora Goh and Claire Thompson for the work involved in producing both the paper and electronic versions of this document.

These papers are being published in electronic format on our web site, where the reader can also find the three-year prospectus for the CBNRM program initiative mentioned above. **Please visit our site at: <http://www.idrc.ca/cbnrm>**

The CBNRM Program Initiative team members would like to extend a special thank you to all the participants at the workshop for a stimulating and enlightening interaction.

May, 1998

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**Welcoming Remarks by Her Excellency Madame Christine Desloges,
Canadian Ambassador to Vietnam**

Professor Dr Nguyen Thanh, Vice President, Hue University
Mr Nguyen Van Me, Chairman of the People's Committee of Thua Thien Hue Province
Dr Tran Van Minh, Vice Rector of the Hue College of Agriculture and Forestry
Mr Nguyen Minh Hoan, Senior Expert, Office of Government Representative
Honoured Guests
Ladies and Gentlemen,

Welcome to this meeting sponsored by Hue University and the International Development Research Centre of Canada (IDRC).

The government and people of Canada have made sustainable and equitable development top Priority in our relationships with Viet Nam and other countries in Asia. I am confident that this meeting of regional and international experts on community-based natural resource management can contribute to that goal in a small but important way.

I understand that there are researchers from 10 different countries in South and South East Asia at this workshop in Hue. Those of you who are new to Vietnam will, I am sure, find this a fascinating and hospitable country and will benefit from your time here. We also have participants from Europe, the United States and Canada who are experts in this field or representatives of IDRC's donor partners. We are very pleased that you can all take the time from your busy schedules to participate in this meeting, and to share your insights as a way for IDRC to sharpen the focus and relevance of its support to innovations in the development of this region.

Natural resource management is a crucial development issue in Viet Nam and In other Asian countries and an issue which has been given high priority by IDRC and by the Canadian International Development Agency (CIDA). Asia's dynamic growth has brought unprecedented prosperity to many of her people, but often at a high cost to the environment. Rural populations are large and growing, but continue to depend on a very limited natural resource base. The overuse and depletion of this resource base is a critical problem whose effects are felt directly by local people. Soil erosion and loss of fertility, land degradation, over exploitation of fish stocks: these problems are crucial because they not only affect the food supply today, but they reduce the very capability of our environment to produce the food which we will all need even more In the future.

There is an urgent need to develop new ways for local communities to better manage the resources on which they, and ultimately all of us, depend for survival. These innovations must include better systems of production, but also better ways of organization and management. They must involve scientific experts, governments. and, above all, the people themselves who will implement and Improve the Innovations through their daily work.

We have found many of the same problems even in Canada, with our much lower population and our rich natural resource base. We are also learning new ways to involve local people in the management of the natural resources on which so much of our economy depends.

The work you are doing is therefore very important to the economic development of Asia, and very new, because even in Canada we cannot tell you exactly how to do it. I know that many of you spend a great deal of your time and research effort working in rural areas, and you will not be surprised to hear that rural people can have some pretty good ideas about how to solve difficult problems. Let me call on some of the suggestions which villagers in Nepal have provided to Mr Anupam Bhatia who is here at this meeting from Nepal. Mr Bhatia is at the International Centre for Integrated Mountain Development. When asked what sustainable and equitable development meant to them, villagers replied:

- Development should not damage the environment The population should reduce
- Day to day needs of the people should be met Development for all social groups is needed
- Women should participate in development decisions
- Changes in the thinking and attitudes of "officials" are needed
- Collaborative systems of management involving farmers and local government are needed
-

I hope you will think about how you can address these practical concerns In your research discussions over the next few days.

Canada is pleased to support such a distinguished and important group of scientists in this difficult task, and wishes you every success in your workshop. Thank you and good luck in your proceedings.

Development, Research and Natural Resources Management: Introductory Comments on CBNRM

By: Stephen Tyler

Introductory Comments

Madame L'ambassadrice
Your Excellency Mr Vice-Chairman Le Viet Xe
Vice-President Hung, Vice-President Thanh, Vice-Rector Minh
Ladies and Gentlemen

On behalf of IDRC, I am very pleased to be able to welcome you here today, and to thank our hosts at Hue University for their able preparations for this workshop. This meeting marks the first time that the Centre has brought together the professional staff, expert advisors, researcher partners, and donors with whom it collaborates most closely in the field of Community-Based Natural Resource Management. It is, I think, a measure of the interest and commitment to work in this field that we have been able to attract such a high proportion of those very busy people invited to attend this meeting. So to start our session I want to express my sincere appreciation to all of you for taking the time from your busy schedules to prepare for and attend this workshop and welcome you here.

IDRC's interest, as most of you know, is to support the generation, by local experts, of new knowledge and innovations to solve practical development problems. This is an organizational mandate given to us by the Government and the people of Canada more than 25 years ago. In that time we have delivered more than 1400 projects including projects in almost every country in Asia.

Our experience in working with Asian experts on agriculture and natural resource management over the years has led to a recent series of projects which we think have some things in common. They all deal with aspects of Community-based Resource Management. It is a great privilege for us to have here today, representatives of most of these projects from across Asia.

I will discuss the issues underlying these projects in a few moments, but for now I will just point out the obvious: if you look around the room right now, you will see a very unusual group of people. You people are from many different disciplines. Most of you have not met before, although you all know IDRC. You are all struggling with difficult research tasks, and trying to communicate using terminology borrowed from other disciplines. You are working with mostly vague theoretical concepts and new methods which do not always transfer well between cultures. You are accustomed to being recognized as experts in your own field, but are struggling with a new and different field of study in which there are very few experts anywhere. This is very difficult work, but you persist because you believe it is important. We share your concern, and want to use this opportunity to acknowledge with appreciation your efforts. We believe you are among the best qualified experts in this field in Asia, and we need your advice.

For the rest of the week, we want you to share with us your views on the research work you are doing. We want to know what you think about the concepts, about the methods you are using in the field and for analysis and understanding of your results. We want to hear about how you have managed difficult interdisciplinary research problems. And we want you to exchange ideas formally, in the workshop sessions, and informally at social gatherings or on the field trips.

We hope that you will learn from this experience, but I must confess that IDRC also hopes to learn from you. If we want to develop a research program which reflects the practical needs of recipients and the development problems which your countries are facing, we should listen to you. So the feedback which you provide us in the rest of the week will be very important to our program planning and decision-making.

Let me refer to the program briefly here to outline the activities of the week, before I take a few minutes to set the stage for our discussions today.

Today, to help everybody develop a common set of ideas and understandings to relate to their own work, we have planned a series of thematic papers from some of the most experienced people working in this region. Tomorrow, you have the choice of two full-day field trips to visit IDRC project sites and see for yourself how these concepts and ideas have a relationship to the practical issues on the ground. Then on Wednesday we want to hear from some of the projects we have supported in the region, to share problems arising from their work and to discuss concepts and methods they have used.

One of the issues which many projects have expressed concern about is the role of gender in affecting the way that resources are managed, used and benefits allocated in the community. To help all of us get a better handle on that key question, we have scheduled a half-day "toolkit" session on Wednesday afternoon. This will help clarify the key issues involved in making sure that your research teams can analyse better the differential implications of resource management for men and women. Thursday is primarily a discussion day, when we will challenge all of you to provide us with feedback and review of the concepts we have been discussing all week. Friday we can finish up our various conversations and agendas while on a very interesting field trip to the remote Aloui Valley, near the Lao border.

Natural Resources Management and National Development

Let's consider the broad path of development and the role that local resources have played in this development in Asia. This has historically been a continent of farmers. It is also a continent of great historical empires: silk and spices got all the attention and money, but it was agriculture which provided the foundation of these empires. While it was the productive lowland padi fields which produced most of the food and wealth, Asia's forests and mountains have been home for many thousands of years to farmers as well. Indeed, there is a great deal of scientific evidence that the once-rich biological diversity of Asia's forests owed a great deal to the deliberate interventions of these farmers. It was their agricultural practices of various kinds which carved out niches in the ancient forests for grasses and secondary growth upon which both the large mammal and human populations depended.

In the colonial period, the imperative of defining territory as a prerequisite for maintaining power became clear. Forest areas which were not privately claimed or cleared for plantations were claimed and demarcated in the interests of the colonial state, even if their use remained in local hands. Many of the systems of land and resource tenure instituted under colonial governments were retained by the newly-independent nations of the post-colonial period. These systems generally alienated the land and its resources from the control of the local people who had previously used them. Technicians and professionals identified such resources as "unused" or "unallocated" and control over their disposition was claimed by the State.

The State's development interests were linked to production, to commercialization of the resource base, and to reallocation of land and resources in the interest of social equity. These interests were rooted in the important goals of improving living conditions for people, by creating commercial opportunities and increasing income, and by providing services to a sedentary rural population. National wealth was built up by the commercial extraction of natural resources and by the secondary industries based on transforming those resources for international markets. Through this process living standards were improved and many benefits obtained for rural and urban people in Asia. Incomes have increased, fewer people are hungry, life expectancy is growing and educational levels are higher. However, the natural resource base has not done so well.

In Asia, a high rural population base has grown rapidly with the improvement of health conditions, leading to tremendous expansion of the agricultural land area, even into areas which have very poor biophysical conditions for agricultural production. Fisherfolk in poor coastal communities have put more and more effort into harvesting a biological resource which is already under pressure from loss of habitat, deep-sea overharvesting, and pollution.

As population grows elsewhere in the country, settlers are encouraged - by the government or by their families or by the market - to move in and cut down those forests. Large national or multinational companies appear without warning to harvest huge areas of forest which was previously used by local people. Major development projects: roads, mines, dams - displace local communities and make it easier for even more outsiders to intrude. For fishing communities, development outside their area can destroy habitat needed for fish reproduction, or pollute the waters they fish. Growing populations dependent on the increasingly limited resource base have fewer and fewer alternatives for survival, never mind improving their welfare. In desperation, and usually even when they know their practices are unsustainable, people are forced to destroy the resource base on which they depend. Or they may find that decisions about the use of these resources are made by outside authorities without their input or involvement at all.

The Development Challenge

This is the development context in which we find ourselves today in many parts of the region: highly stressed, marginally productive ecological systems crumbling rapidly in the face of this kind of pressure.

New settlers cut forest lands for agriculture; traditional lowland farmers are displaced by dams, plantations or maybe armed conflict; traditional upland swidden farmers have no more forest land and are forced to shorten fallow periods, depleting soil fertility; while on the coast fishers scoop out the smallest immature fish before they can reproduce. Further degradation of resources only impoverishes people more, causes damage and destruction downstream, makes the country less able to feed itself, and so makes all the problems of national development even more difficult to solve.

In spite of the best efforts of national and international experts, these problems have been very persistent ones. Many approaches have been tried, but in those sensitive agro-ecological zones which are of most concern to us here today, very few have been successful. Research efforts to address these problems have often discounted the role of local people in fashioning solutions. The men and women most directly affected are typically the poorest of the rural poor, often members of ethnic minorities and politically and economically isolated from the mainstream. Ask any villager in an uplands community, or a remote coastal fishing community, in SE Asia: if you look at the resources on which you depend for your income and for your family's food supply, what condition are those resources in? The answers they will give you describe their fear and despair, but also provide the seeds of hope.

They know many of the problems of increasing production in their current environment. Yet they feel they have no practical alternatives under the prevailing system. They are prepared to invest their effort and limited resources into improvements in order to increase their livelihood choices and their well-being, if they are convinced that returns are likely.

Communities have resources already: social networks, decision-making systems, conflict-resolution mechanisms, enforcement tools. They have some knowledge of their resource base and ecology. They may or may not have the control mechanisms to implement resource management decisions which extend beyond the level of a single household or a single farmers field.

In short, these people display a number of assets essential to resolving the problem: they may have intimate knowledge of the local resource base; they are motivated to improve productivity if they can be assured of benefiting; they may have decision processes and social enforcement methods for resolving resource conflicts; and they are hopeful in spite of the desperation of their circumstances. Many of these potentially valuable assets are currently being eroded, further weakening the capacity of these communities to improve their well-being through better management of their natural resource base.

This is the development challenge: to provide poor villagers, dependant on steadily-deteriorating resources, with alternatives for sustainable livelihoods. In order to address the challenge, we have to develop packages of innovations which can be practically implemented at the initiative, and building on the motivation, of the villagers themselves.

The Research Challenge

Much effort in all countries of Asia has gone into the development of improved agricultural technologies: ways to make the resource base more productive, ways to generate higher returns for farmers. Scientific advances have contributed enormously to the higher food production in Asia. But sometimes scientific advances fail to lead to real improvements in food productivity. If they are to be sustainable, innovations must be endorsed by the farmers and villages who adopt them. The best scientists in the world cannot solve the problems if they do not make sense to villagers.

This approach is now widely understood in agricultural production systems research and extension. The test of any good innovation in agricultural production and resource management at the village level is: do the village farmers adopt and use it after the end of the trial period? Many insights in natural resource management have come from an analysis of failures of various technical innovations.

Research has also tended to focus on improving productivity of natural resources in the production of commodities: getting more rice, more corn, more trees, more fruit production from a given set of inputs. This is very important, but it is also deficient in recognizing the value and role of natural ecosystems. Sustainability of production requires that linked natural systems be kept in balance, not that they be managed to maximize output in one or two narrowly-defined dimensions. We are all aware of the crucial importance of living systems in providing us with the services which sustain life, maintaining air and water quality, in renewing soil fertility, and in providing the foundations for all food production. We have to pay attention to the support of these ecosystems, so that we do not overload crucial ecological systems by emphasizing too much the production of single resource-based commodities.

There is also increasing recognition that resource management requires collective action. It cannot be addressed by individual households alone. This means we have to study the nature of different kinds of organization, the advantages of different systems of decision-making, ways of organizing incentives, rights of individuals and groups, obligations and penalties. Often we think of these systems as being only formal, government approved regulations. But in fact, there are many informal and local rules for how resource use is organized, who makes decisions, how these rules are enforced, etc. Without a clear understanding of these factors, technical improvements are likely to go astray.

In the face of this regional development and research context, IDRC programming has evolved in consultation with recipients and regional leaders. Over the past 25 years, crucial foundation work was undertaken to establish and support regional institutions with strong disciplinary credentials in agricultural production systems, forestry, fisheries and aquaculture, post-harvest systems management, agricultural economics and other social sciences in rural development and food production. Many technological projects and social science projects were successful in building essential disciplinary skills and introducing innovations in these fields, but they seldom incorporated other disciplinary perspectives. In relation to the deepening problems described above, they only addressed fragments of the complex constraints facing rural communities. More comprehensive and systematic approaches, including Farming Systems

frameworks and Production to Consumption Systems were adopted in project development, training and research in recent years. These approaches have also yielded benefits and broadened the previous disciplinary bases of research support.

Now we find that in considering the whole range of issues which impinge on resource management at the local level, we are faced with the need to study, and to innovate, in multiple dimensions at the same time. In order to assure sustainable food production and improved local livelihoods, we may have to develop technical, methodological, analytical, institutional or policy innovations. This kind of research could include any or all of the following approaches:

- Knowledge transfer - better ways for local people to understand the ecological value of productive resources, and for experts from outside the community to recognize the scientific and development value of local knowledge. Both local communities and development interveners should be better able to identify their needs for specific information to improve productivity and sustainability.
- Improved production technologies - in order to reduce degradation and increase productivity. Innovations will increasingly rely on optimization of interactions between different production elements (e.g. agroforestry, livestock, aquaculture, irrigation).
- Innovative organizational or management systems - local development of decision processes, resource inventory, allocation and monitoring mechanisms, capacity-building for disadvantaged groups, conflict resolution, particularly in relation to common property resources.
- Policy innovations - development of local regulatory mechanisms and enforcement; supportive of senior and local government interventions on such matters as land use and tenure policies, taxation and other economic incentives; incentives for greater sustainability; increased policy responsiveness to local resource conflicts.
- Interaction and integration - improved methods for integrating other components, smoothing information flows between different actors, better communications and verification of resource status, plans, processes and outcomes.

We can think of this list of innovations as a preliminary definition of the learning and research agenda for Community-Based Natural Resources Management (CBNRM).

How do we undertake this research?

Seeing the need, and defining the scope of research activities which might address that need, help us to get started. But the task is clearly a very large and difficult one. We can see some of the implications by using familiar examples. We have all seen cases like this, where irrigation, or watershed management, or marine protected areas, or integration of grazing and fodder with land reforestation and rehabilitation, require many of these steps: improved local and scientific understanding of the resource base and its dynamics; improved technical responses, new tree species, better extraction technologies; institutions for protecting and

conserving sensitive and valuable resources through collective action; mechanisms for collective decision-making, enforcement and benefit-sharing.

All these elements become important aspects of the research work in CBNRM. They require researchers to develop or become familiar with new tools:

- tools to help with resource inventory, mapping, monitoring or information transfer
- new technologies (or perhaps rediscovered indigenous local systems) for green manure, agroforestry, marine products harvesting
- new techniques for mobilization and organization of communities, and new channels for interaction with senior levels of government
- new mechanisms for managing conflicts, negotiating with stakeholders, and reinforcing collective action
- new incentives and financial rewards (tenure, credit systems, value-added)

The way in which we undertake the research must itself be empowering, helping to build and reinforce the motivation of villagers to improve their situation. The research approach must also be inclusive, recognizing that in every village, there will be some households and some groups better off, while others are worse off. We only succeed if even the worst-off people benefit. In particular, the research has to be sensitive to the needs of women and ethnic minorities, because these groups often are the poorest, and are easily ignored or under-represented when outsiders, or local leaders, try to diagnose resource management issues. Local interventions also must be supported by complementary policies: therefore researchers must have an understanding of how policy support can be introduced.

None of this is easy. The formulation, organization and management of the research task itself becomes complex and challenging. Researchers need to work in multidisciplinary groups, sharing information, and communicating methods, approaches, and problems between different disciplines. This is very difficult.

We want to say right now that we recognize this is difficult. We acknowledge our respect and admiration for all of you: researchers who have joined with us in this challenge. We do not expect that we will always get it right. We expect that we, and you, will make mistakes as you struggle with this challenging research agenda. But we want to know how we can help you to learn from your mistakes, and learn from each other, to improve your skills in this kind of research, and to improve the effectiveness and impacts of your research work in providing practical solutions to local and government decision-makers.

We also know that not all development problems can be solved this way. CBNRM research is not a panacea. There are important research needs in improving commodity crops and in developing better farming systems. The community level is inappropriate for some kinds of resource management, where the key management decisions necessarily involve a much larger area. Community leaders may be just as short-sighted or narrowly self-interested as the most rapacious outsiders. Technical skills may be weak at the community level. Strong sanctions against inappropriate patterns of resource use can only be imposed by the State. For all these reasons there are limits to what CBNRM can achieve, and there is an important need to balance research in this area with other needs for innovation.

But we believe that the interest shown by many governments and international development organizations in improved methods and tools for CBNRM amply justifies the effort we can devote to developing your skills as researchers in this field.

These are our ideas about the CBNRM research agenda. But we know that you have ideas, and a great deal of practical experience, as well. So after this introduction, we want to shift to "listening" mode, and to listen to what you have to say to us and to each other. We want to hear more from you about what you think of this research agenda, about the implications this has for the way you undertake research, and about the problems you have already experienced as you struggle with these challenges. We hope that you will tell us what methods and tools you have tried, and which you need to learn more about. We hope that your inputs will change our own views, and that we will learn from your experience. We hope that together, we can craft an approach to continued research support in Asia which will help you to be successful in addressing these challenges.

So on behalf of IDRC, I welcome you once again to this workshop. We deeply appreciate your commitment to being here and working with us this week. I look forward to a productive and stimulating week together.

**FROM FARMING SYSTEMS RESEARCH
TO A CBNRM RESEARCH AGENDA:
ITS USEFULNESS IN VIETNAM**

By: Vo-Tong Xuan

Abstract

As market oriented economic development proceeds, Vietnamese farmers in rural areas continue to experience great disparity in income compared with other sectors. They revert to natural resources as the most accessible sources of livelihood. Several farming systems are practised by rural households at various agroecoregions. While each system might bring benefit to an individual household, the conflicts in resource utilization often nullify the effort of the whole community. Therefore, a better approach to sustainable natural resource management must be designed to help poor farmers in less privileged, fragile areas. The Vietnam Farming Systems Network -- a consortium of nine agricultural universities and research institutes located at all the agroecosystems of the country, with major assistance from IDRC -- carries out a nation-wide research program to address these problems. This paper reports the preparation stage and the approaches that the Network is using to involve farming communities in the management of their own natural resources.

1. The Setting: Endangering Natural and Human Ecology

Under Vietnam's *doi moi* policy, economic development has been made remarkable. In the agricultural sector, farmers now tilling their original land and are free from the exploitation of the Soviet-style cooperatives. With increasing agricultural production throughout the country, during the last several years, agriculture now contributes to more than 50% of the GDP. Unfortunately, farmers' incomes continue to be low compared to those of the industrial or commercial sectors, and poverty in rural areas of all the nine agro-ecological zones is a concern of both local and national governments. The poor farmers continue to depend on natural resources for subsistence. In mountainous regions, they have been slashing bushes and trees to make space for food production; in the coastal areas, mangrove forests were taken away for firewood as well as for shrimp farming. Wildlife continues to be endangered by wanton exploitation of forest scavengers. As the resources in the northern mountainous region became exhausted, during the past five years since 1991, an exodus of nearly 1.5 million persons have migrated to the central highlands to find more natural resources to exploit. At the new settlement, these people continue to clear the land, not for food production but more for illegal logging and wildlife hunting. In addition, the pressure of people from the lowlands has driven the ethnic minority people to even higher elevation. Demoralised, the ethnic people lost their arable land, have to live in new settlements where lack of food and clean water, poor shelter, poor education and health care, and inadequate other infrastructures compelled them into exploiting the natural resources for subsistence. Their technical knowledge, largely primitive, must rely on natural resources as means of survival. In early April 1997, the problem had become a serious threat to all watershed areas of the country, prompting the Central Government to issue an order for closing the forests, banning all slash-and-burn practices in hilly areas, and speeding up the assignment of land user's title to the indigenous farmers. What will happen to the livelihoods of the inhabitants of these areas? How could they meet the

demand for daily food and other necessities when the forests are closed? Could the forests be closed successfully after all?

Such are the problems in the uplands. On the other end --in the lowland-- favourable irrigation and drainage give farmers better opportunity for food and other crop production. The lowland farmers have been undergoing successive periods of collectivization and decollectivization. The present result is an individualistic crop production system on fragmented land such that each small farmer tends to compete with his neighbours for more water and better crop yield by applying as much agrochemicals as they can afford, causing a host of problems in crop and water management, environmental pollution, and chewing up the meagre income from their under-priced paddy and other produces. On the other hand, fortunately, there are farmers who have learned improved and appropriate systems suited to their natural and social conditions that could bring better income as well as safeguarding their immediate micro environment. But these experiences are often isolated and cannot be expanded widely due to financial difficulties and rigid government land use policy.

In order to provide the government with a framework of agricultural policy for sustainable rural development, a farming system research and extension approach has been implemented by various organizations both from the public sector and the civil society. Since 1990, the Vietnam Farming Systems Network (VNFSN), a consortium of nine agricultural universities and research institutes located at all the agro-ecosystems of the country, with major assistance from IDRC, carried out a nation-wide on-farm participatory research program. Eventually we ran into resource-use conflicts between farm households that could hardly be settled by individual persuasion. This paper reports some salient experiences of the VNFS Network that lead to the need for modifying our research strategy to adopt the community-based natural resource management approach.

2. Farming Systems Approach in Poverty Alleviation

Farming systems development concepts and approaches have been introduced to all Network members. The nine-institution Network involved 111 scientists. At each institution a multi-disciplinary research group has been formed. We gathered scientists, faculty members, researchers and research assistants, extension workers, etc. from various institutions and various backgrounds into a large network promoting approaches and methods in farming systems research and extension methods (FSR/E). This approach was applied to set research priorities and to further develop appropriate agricultural systems that are both economically and environmentally sustainable and further increase farm household income, nutrition and welfare. There are 28 research sites covering the six different agro-ecological zones of Vietnam where this research was conducted.

2.1 Research highlights

(i) **In the northern mountainous region**, research activities focussed on sloping agricultural land technologies (SALT) as an alternative to slash-and-burn practices. Hedge-rows on the contour efficiently reduced soil erosion and this resulted in a higher soil fertility, re-

flected by higher yields of corn, peanut and mungbean grown on the alleys. Fruit trees were planted on the upper alleys to provide a mini-watershed. On the unfertile upland soils the diversification into livestock, crops and aquaculture gave higher profits than earlier practices and improved the soil fertility as compared to the monoculture of cassava commonly practised in this area.

(ii) The central coastal region of Vietnam is dominated on one side by sandy coastal ridges and on the other by hilly or mountainous areas. The agro-forestry model tested proved to be suitable for new economic zones in these mountainous areas. In the plains area, the rice-upland crop pattern gave a higher economic return as compared to monoculture of rice. In the coastal sandy area, with proper phosphate fertilization, peanuts gave better yields after rice and red pepper and sweet potato were planted in rotation with rice as another cropping pattern. The integration of forest, livestock, fruit trees, vegetables and aquaculture in the system resulted in higher profits for farm households and helped maintain soil and water conservation.

For the central coastal region, the project recommended diversity in existing farming systems. The agro-forestry approach should be applied in hill areas to protect watersheds and for the coastal belt, various integrated cash crop-aquaculture-livestock practices are recommended as a system.

(iii) In the Central Highlands, a group of ethnic farmers in the mountainous region practised SALT quite successfully. At another site where industrial crops are the major product, various combinations of intercropping of cash crops with rubber trees was tested with ethnic farmers. Some upland rice varieties, mungbean, peanut and hybrid corn performed well under these conditions. Participating farmers also introduced pigs in their system in order to increase their income. The introduction of intercropping methods did not affect rubber growth.

In the slash-and-burn areas in this region, SALT techniques are recommended. In newly established perennial plantations, inter-cropping of cash crops and upland rice should be promoted.

(iv) In the Southeastern region dominated by the red basaltic soils, intercropping patterns of maize and beans gave higher profits as compared to a monoculture of maize or beans. On degraded soils, intercropping of cash crops in cashew plantations with the integration of livestock such as cattle and chickens, could be practised. Rice - peanut systems gave higher incomes and improved soil fertility as compared to monoculture rice. Animal waste could be used in biogas digesters to obtain cooking gas and benefit the soils and the environment.

(v) In the Red River Delta it was found that soybean, (Irish) potato and high value vegetables could replace corn to give higher incomes and to preserve the soil fertility during the winter to follow a very short duration high yielding rice variety (instead of the six-month IR8 rice crop as normally practised by farmers) before the second (main) rice crop is planted. On the low lying part of the delta profitable farming systems involving rice, cash crops, fish, livestock and fruit trees are possible. Economic returns from these improved systems increased farm

income 2.5 times, indicating that diversification of agriculture in the Red River Delta is both feasible and profitable.

(f) **In the Mekong Delta**, where rice is the main crop, the very low income from rice monoculture was raised substantially by introducing aquaculture into the system. The group tested various combinations of aquaculture species such as fish, fresh water shrimp and brackish water shrimp. These tests showed that rice-based aquaculture systems integrated with livestock and fruit trees can help rice production and improve income diversification opportunities. Aside from aquaculture integration, livestock integration in the production system also helped in developing sustainable farming methods.

2.2 Farming Systems Research impacts and policy implications

(i) Progress in research and the findings have been reflected in various party and government policy guidelines on sustainable agriculture and rural development, particularly the Party Resolution of the Fifth Plenary session. Successful results such as the application of the SALT system in Trang xa village, Vo nhai district in the mountainous province of Bac Thai (now Thai nguyen) were promoted by local authorities. They organized farmer's and politician's field days offered to all 12 mountainous provinces in northern Vietnam.

(ii) Network members work closely with related research centres and institutes through research and policy meetings, through national workshops, conferences and other meetings. They presented their results, approaches, methods, and techniques used in farming systems development. Results obtained at the research sites were shown to provincial officials of departments of agriculture, to the departments of agricultural extension, the departments of science, technology, and environment and others in order to extend the results to other and similar areas.

(iii) From these results, we believe that options exist for each agro-ecological region in Vietnam, allowing for more profitable development in terms of income and employment generation while the environment is still maintained in good condition. These options and approaches need to be promoted and understood by both local and central governments. Such development options need to be supported and accompanied by appropriate extension programs as well as flexible farm credit programs. Farmers will not be able to apply improvements to their methods and production system without support. However, as mentioned earlier, there are problems that the farming households are constantly in conflict with each other, particularly when it comes to sharing common resources such as land and water.

3. The Need to Move Beyond the Household Boundary

Land and water use conflicts:

In the uplands: although the government is trying to assign land user's title to hilly and mountainous farmers, the process is too slow to stop the slash-and-burn practice and especially

the illegal logging. Some individual farmers in northern mountainous provinces try to reforest their newly assigned hills but soon they are discouraged by the destructive ranging of water buffalo or cattle herds of their neighbours. In the Central Highlands, individual coffee farms were established in response to increasing world price. Each farmer-operator had his own deep well drilled, and pumped out as much underground water as he likes, causing a virtual water shortage, affecting all crops in the region.

In the lowlands: several new conflicts develop as individual farm households are trying to compete for the advantages. Some examples:

- annual crop producers (rice, corn, soybean, vegetables, etc.) are aiming for high yields, using every possible agro-chemical that they have, regardless of the environmental effect on their own or their neighbour's land and crops.
- in acid sulphate soil region, such as in the Plain of Reeds, the upstream farmers are flushing the acid water down to the downstream farmers' fields, causing substantial crop yield reduction and fish death in the canals and ponds.
- individual farmers often deliberately break the dike of irrigation canal in order to take water into their own field, without thinking of the shortage of water for those located down the line.

In the coastal areas: mangrove forests were destroyed extensively by farmers to build shrimp farms. As these shrimp farms are built individually and spontaneously, the discharge water from one farm became the intake water for another. Gradually shrimp diseases were spreading to all shrimp farms, causing heavy losses to the farmers altogether.

Competitiveness wanted: As Vietnam joins ASEAN, and eventually AFTA and WTO, certain commodities/products for export to foreign buyers will need to be produced in large quantity at a uniform quality, delivered on a pre-determined time, and sold at the least expensive price. Surely, individualist farming will not be able to meet those criteria. Some form of community-based production must be organized and the farmers will have to be organized for doing so.

Improvement of interdisciplinary research: Our research so far paid most attention to the integration of crops into the existing farming systems for individual farm households. But, too little effort was made to integrate livestock and forestry research. Therefore, further research should put more emphasis on the integration of livestock and forestry into existing farming systems within the boundary of an appropriate community in order to enhance the mutual benefits of each household. Since farming system research within a community can be complex, there is also a need to improve researchers' skills related to experimental designs, statistical methods and extension strategies as these relate to CBNRM-FSR/E. Social scientists should participate more in the research. They should try to find out how a community of farmers adapt new technologies and how FS technologies have an impact on the community's well-being in and outside the research sites.

The role of women in farming system: Women are often neglected in agricultural research and extension activities. They play an important role, particularly among ethnic minority groups. Female farmers have much potential to help improve the production systems. With the help of

social scientists, more attention should be paid to gender analysis studies in the generation of new farming systems and technologies. These innovations and their impacts on the life of women should be evaluated.

Application of findings through farmer groups: The implementation of results of improved farming systems are more limited in the Red River Delta due to problems of fragmented land tenure. Likewise, in hilly or mountainous areas, farmers live in scattered and isolated houses. In these situations it is difficult to apply uniformly improved farming system because of the diversity in their socio-economic or bio-physical environments. Therefore, the organization of these farmers into groups in order to spread results should be given attention.

Development of agricultural services, marketing and food processing: Agricultural extension activities, credit supply, food processing and marketing institutions are very important as these relate to the development of diversified farming systems within each community.

Farming system approach for community-based natural resource management: Common experiences showed that in some research sites, local administrators and farmer's groups played very important roles in the implementation of results to the larger community. Inter-disciplinary research teams, local administrators and local community organizations could be organized to work together more efficiently to apply scientific and technological innovations in direct response to community priorities in a way that reinforces the sustainability of agro-ecosystem productivity. More in-depth research along this line in all agro-ecosystems is encouraged in the immediate future. Participatory system research approaches for community based natural resource management based on skills and experiences learnt by the Network could be a focus for designing further research activities.

4. Preliminary Experiences with the CBNRM Approach

After receiving the approval for a second phase research by IDRC, the VNFS Network members made necessary preparation for an initial workshop to discuss strategies for implementing research on CBNRM in our respective agro-ecosystems. We used various technical materials featuring CBNRM, including the training materials prepared by IRRI and publications from a similar CBNRM program in Senegal conducted by the Virginia Tech University.

Network training on CBNRM: Our main emphasis is placed first on network training for participating scientists of the concepts and practical components of the CBNRM approach. The first 40 Network scientists were introduced to the concepts and discussed thoroughly the possibilities of applying these concepts in actual situations. Everyone recognized the necessities of organizing and involving a sizable community into a participatory research scheme, which will be preceded by a benchmark participatory rural appraisal (PRA) of the selected location by a multidisciplinary team of natural and social scientists. Based on the PRA analysis, a community within the location will be chosen and a detailed participatory appraisal planning (PAP) will be worked out and implemented with the community members. The execution of the program will be monitored and evaluated by both the researchers and the

participating community according to the following criteria: soil and water resources conservation; labour use; income generation; stability of the community.

Representativeness of agroecological systems: From the existing maps of soil and water resources and land use, we have selected 16 approximate locations for our local CBNRM programs at 6 out of 9 major agro-ecological zones. The selected locations of the 6 zones represent 15 out of a total of 62 sub-ecosystems, and 19 out of 40 soil types. There are about 20 out of a total of 59 ethnic groups involved in these locations.

Ecosystem analysis and choice of sustainable farming system: To date, our Network members have completed the benchmark survey to determine the available soil, water, climate, plant and animal resources, local indigenous knowledge, and their respective socio-economic environment. The existing social and governance structure of the communities was duly noted. We tried to trace the historical development of the existing communities and the state of their environment. On open-access natural resources, we analyse the situation to identify the strong and weak aspects in their management by the community; from there an attempt in designing research with the community in sustainable agricultural development will be made mainly for generating the most appropriate integrated farming system. A number of farming systems based on local indigenous knowledge and experiences from the Phase I of the VNFS Network may fit into the design at each location: rice-based cropping with annuals (cash crops, short duration industrial crops), and/or with perennials (fruit trees, forest species on hills and mountains, and coastal areas), integrated with livestock and/or aquaculture.

Credit scheme: Our hypothesis is that in order for an individual farming system to be successful, the component enterprises within a household's farming system should fit well within the community. The planned enterprises will need sufficient finance in order to enable the farmers to apply appropriate technology under the guidance of our technicians. But as farmers are mostly poor, we shall have to form a credit group at each location to administer the credit scheme, thus the need for working with the whole community. We plan to involve the provincial Vietnam Agricultural Bank in this program. Hopefully, this approach will yield a better way for the government to give credit to farmers -- not to individual farmers but to united communities of farmers. The farmers will not shy away from such a bank loan as many of them do at present for fear of being unable to repay because they do not know how to make that money grow successfully. With the CBNRM approach, they know what technology to apply, and the loan will be needed and used appropriately under the guidance of the participating scientist in their community.

Community size: But how large is the community to be selected? We decided preliminarily that depending on the available credit fund at each location, as well as the uniformity of the area in terms of human ecology and geographical characteristics, a group of 20-40 households will be invited to participate in our CBNRM program. Within a household, we shall see to it that the distribution of labour to participate in various activities of the program should be right; the role of rural women will be placed in a more effective and appropriate way.

5. Looking Ahead

As the Vietnamese government is preparing the minds of all farmers to return to collectivization anew, to provide opportunity for poverty alleviation and hunger eradication, as well as to empower the Vietnamese agricultural producers against tough competition in regional and world trade, a sound policy for the encouragement of farmer communities to manage their natural as well as human resources must be in place as soon as possible. We believe that the CBNRM program of our VNFS Network will generate important examples to policy makers to decide.

RESOURCE TENURE AND ANCESTRAL DOMAIN CONSIDERATIONS: THEIR IMPORTANCE TO A CBNRM RESEARCH AGENDA

By: June Prill-Brett

Abstract

This paper calls attention to the importance of understanding the indigenous resource tenurial systems within the context of ancestral domain. This is of special concern for the Government and Non-government agencies that are assisting communities in the process of empowering them and enhancing local capability to manage natural resources in a sustainable and equitable way. It argues for the implementation of the Department of Environment and Natural Resources Department Administrative Order No. 02, to be carried out on the local community level, rather than the municipal level, where the full participation of community members is often ignored or overlooked.

1. Introduction

This paper focuses on resource tenure and ancestral domain considerations in the context of the Cordillera highlands of northern Philippines, and their importance to a community based natural resource management research agenda.

The paper calls attention to the importance of understanding the indigenous resource tenurial system within the context of ancestral domain, especially when assisting communities in the process of empowering them and enhancing local capability to manage natural resources in a sustainable and equitable way.

The Cordillera

The Cordillera is geographically located in the northern part of Luzon, the largest island in the Philippine archipelago, which is composed of 7,100 islands. The Cordillera is formed by a series of mountain chains with heights ranging from three thousand to over nine thousand feet above sea level at Mt. Pulog, the second highest mountain in the Philippines.

Cordillera culture is characterized by its diversity. There are at least seven major ethnolinguistic groups with variations in their resource management practices. Historically, the residents of the Cordillera highlands had resisted colonization for over three hundred years until the turn of this century, when it was administered under the American colonial government. However, the indigenous communities continued to practice their traditional resource management activities --- with minimal intervention from the colonial government in managing their internal affairs.

Indigenous Land Tenure Systems in the Cordillera

It has been observed that the more successful community resource management systems in the Cordillera are those that are generally under the control and management of indigenous communities --- particularly the communities practising common property regimes.

Effective resource management systems have developed over time, in the communities' close interactions with their environment and among resource users, in effective institutional arrangements.

Property Regimes

In trying to understand resource tenure existing in the Cordillera, it is important to consider the fact that not all communities have traditional common property¹ institutional arrangements (e.g., ancestral domains). Communities that lack a tradition of managing common property regimes differ from those communities associated with a long tradition of common property institutions. These are governed by a body of rules in the access, exploitation, and conflict management of social relations pertaining to the use of common shared property resources. Thus a distinction has to be made at the outset regarding the types of communities found in the Cordillera.

First, are the traditional communities that have a long settlement history (e.g., over several centuries), allowing for the establishment of a strong attachment to a territory/domain. This includes the residential area, sacred sites, and the natural resources which have been exploited and managed through rules governing rights and obligations. These communities are also of two kinds:

- (i) the traditional swiddening communities; and, those practising
- (ii) traditional wet rice irrigation, with swiddening (*uma*) as a complimentary livelihood activity.

Second, are the communities that have been more recently established by people from neighbouring communities, or from other places in the Cordillera. Most of these "newly" established communities have been created by pioneer farmers who converted the mossy forests, second growth pine forests, or dipterocarp forests into agricultural land. Most of these highland farms are planted to cash crops,² encouraged by the market demand for temperate vegetables. Ethnicity is generally characterized as heterogeneous. The act of clearing and "improving" the forest, often through permanent gardening is a strategy used in gaining possession to what is perceived by the claimants as an "open access" resource. The property system resulting from this activity, and the

¹ Common property refers to those situations where there are multiple users of a resource who hold divided title but undivided shares in the (resource) physical object (Appell, 1991:2). According to Appell a divided title may either be a parallel right, that is, identical rights held by multiple title holders, or stratified rights, which are divided by type, such as residual and use right, and vested in jural persons.

² This agricultural practice has been referred to by Michael Dove as *truck* farming in his Indonesian study (1988:16-17).

most preferred tenurial security instrument by the farmers, is "private" individual rights to areas on which they have invested money and labour. Some of these lands have already been tax declared.³ It has also been observed that communities engaged in truck farming usually lack the concept of common property resources, and the traditional resource management practices.

The Traditional *Ili* As A Resource Base: The Ancestral Domain

The *Ili* refers to a physical or geographic area, historically inhabited by a homogeneous population who can trace their descent from common ancestors, who were the original founders of the village, and who share and manage common property resources, governed by customary law. Citizenship is primarily based on relationships of consanguinity (blood), and of affinity (marriage), and the exercise of rights and obligations in relation to shared common resources within a well-defined territory (see Prill-Brett, 1993, 1994, 1995). This defined physical and cultural territory is referred to as the **ancestral domain** of a distinct individual community.

However, the concept of *Ili* is not universal in the Cordillera. The term is used primarily among the communities that have practised traditional wet rice irrigation, while the predominantly traditional swiddening communities and the commercial farming settlements do not necessarily share this concept.

Within the traditional domain of the *Ili* are resources which have been considered as the exclusive property of the community. Property regimes have been developed over time as a result of the interaction of the people with their natural environment, through the process of selection and adaptation (Rambo, 1983; Rambo and Sajise, 1985). Social arrangements, with respect to rights in natural resources have evolved in these interactions. Indigenous property systems pertaining to natural resources have been found to be practised among the indigenous communities, especially among the wet rice irrigators (Prill-Brett, 1985, 1993; Boquiren, 1995). The three types of property regimes fall under the following:

- (i) Common property regimes
 - Communal
 - Corporate; and
- (ii) Individual property regime

Common property regimes are of two kinds: Communal and corporate property. **Communal property regime** refers to the property rights vested in all members (past, present, and future) who have usufruct rights to all the natural resources which have not been improved or claimed by individuals or corporate groups. These communal property resources include forest products, untapped springs, rivers, grazing land, hunting grounds, and sacred sites. Rights of exclusion (Malayang, 1991) to non-citizens is an important characteristic of this property regime. However, exclusionary rights may vary among the different communities that recognize communal domain property system. These rights are inalienable to non-citizens of the village (*Ili*). A distinguishing

³ Tax declaration papers are generally perceived by farmers to be as good as titles.

characteristic of the *Ili* as an ancestral domain, is primarily through the existence of resource management practices covering common property resources that *Ili* are identified.

Corporate⁴ property (see Prill-Brett, 1993; 1985) refers to the restricted rights vested in the members of a descent group who owns property, through their genealogical relationship with an apical founding ancestor or ancestress. These predecessors have improved and claimed the land,⁵ primarily for agricultural purposes. Usufruct right to use the resource is devolved to all the descendants -- undivided. This type of property is sometimes referred to loosely as "clan" land (e.g., *tayan*, *saguday*). In comparison with communal tenure, corporate tenure follow more restricted rules pertaining to rights of access, use, and management of common property resources. These common property resources include swidden land (*uma*), mango trees, fishing sites along portions of the river, common graveyards, grazing land, and irrigation canals.

Individual property refers to a type of property relationship which is the most restricted in form, and compared to common property regimes, it is the closest to state private property classification. However, it differs from the state system in relation to its more restricted rules governing access,⁶ and most especially with alienation. Individual property resources generally include permanent improvements on the land such as the construction of terraced irrigated rice fields or pondfields (Conklin, 1980), agroforests (*muyong/pinugo*), permanent gardens, and houselots. These are inherited by individuals, usually upon marriage, and managed by the family. Among the three types of property regimes, individual property regime is considered to be the least threatened by the introduction of external property system influences.

The Introduction of a Western Concept of Natural Resource Management and State Property Regimes

The Regalian Doctrine⁷

The Philippine legal system of land ownership follows the principle of Regalian Doctrine, under which the state owns all natural resources. Article XII, Sec. 2 of the 1987 Philippine Constitution states as follows:

⁴ Any social grouping that has the power to enter into jural relations within a specific jural system is a corporate grouping for the purposes that it is allowed to enter into these relations. According to Keesing (1976:243), it is a group of people who act together as legal individuals.

⁵ A ritual is usually performed by the claimant to ask permission for the release of the piece of land from the spirits (*anitos*) of the forest, believed to be the guardian-owners.

⁶ Usually devolved through inheritance, and governed by rules of transfer --generally to kinsmen. Theoretically, irrigated ricefields are claimed never to be alienated from the family. However, in actual practice it may be alienated, but only during crises situations, such as the need to produce the required sacrificial animals for the performance of curing or death rituals, usually for a senior family member, or in payment of fines for violating custom law..

⁷ When Ferdinand Magellan "discovered" the Philippines in 1521 and planted the Spanish flag on Mactan Island, he laid the basis for a legal theory known as the *Regalian Doctrine*. All lands was presumed to belong to the Spanish Crown unless a royal grant described in official documentation recognized a contrary property right. In 1985, and in the 1987 *Philippine Constitution* the Regalian Doctrine remained the theoretical bedrock upon which Philippine national land laws are based (Lynch, 1986:270).

All lands of the public domain, waters, mineral, coal, petroleum and other mineral oils, all forces of potential energy, fisheries, forests or timber, wildlife, flora and fauna, and other natural resources are owned by the state.

Land Classification

Lands are generally classified as private or public land. **Private lands** are lands which have been segregated from the general mass of the public domain by any form of grant by the State, and which is in the possession of the original grantee or his successors-in-interest. The title to the property may be in the form of a grant from the state, that is, it may be a deed of sale, adjustment of title, special grant, or possessory information title converted into a record of ownership.

Public lands refer to all lands that are not acquired by private persons or corporations either by grant or purchase, and generally classified as *agricultural* or *non-agricultural* lands. The latter is further sub-classified, according to its use, as *residential*, *commercial* or *industrial*. The 1987 Philippine Constitution classifies **public lands** under *agricultural*, *forest or timber*, *mineral lands*, and *national parks*. Only lands classified as *agricultural* may be declared as disposable lands (A&D) and owned by private persons. However, the Revised Forestry Code (P.D. 705, of 1975) has declared all lands of the public domain falling under the 18 percent slope rule, as non-alienable and indisposable. This policy negates the classification of most of the centuries old highland terraced pondfields, which should generally fall under agricultural land (A&D), and therefore, alienable and disposable.

Conflict of Resource Management Systems: State vs. Indigenous System

Here lies the problem --since about 80 percent of the Cordillera region falls within non-alienable and non-disposable classification. Security of tenure is thus, denied to highland dwellers due to government policy which is inappropriate to the Cordillera situation. Despite the indigenous communities' long historical occupation and control over these lands, the State has, nevertheless, declared these as public *forest lands*, *forest reserves*, and *watershed reservations*.

Although the government has declared all forests and other natural resources as belonging to the state, the DENR lacks the personnel to protect the forests. This inability of the state to enforce its own policies has been referred to as a "weak state" (see Rood, 1993; Kummer, 1992). A consequence of the weak enforcement of forest policies has resulted to open access resources, and accelerating forest destruction (Porter and Ganapin, 1988). This situation has been demonstrated in the Cordillera by the conversion of almost all the mossy forest in the Mt. Data National Park --- to a commercial vegetable farming area. Other such public forests are currently under threat.

A New Orientation Of The Government To Land Tenure Practices of Indigenous Communities

Over the past decade, the government has increasingly realized that no effective forest management program can be implemented without first addressing the basic right of the indigenous

upland communities to survive, and integrating these into government forestry programs. Unless tenurial stability and livelihood security is attained by the indigenous communities, it would be difficult for any government program to claim success in sustainable resource management.⁸

With this perspective, government envisions that the sustained, effective and efficient management of forests shall be the concern of local communities with strong, viable community organizations, working in close coordination with the DENR and other government agencies, NGOs, research institutions and peoples organizations.

In 1992, the Environment and Natural Resources (ENR) Sectoral Adjustment Loan Program (SECAL) was initiated. A major component of the ENR-SECAL is the Regional Resources Management Program (RRMP), a community-based development program that is geared towards the development and management of watershed and upland resources.⁹ Government RRMP is based on the principle that sustainable resources management would more effectively be a function of empowered local communities. The assumption is that the latter would be more likely to make long-term investments towards the conservation and sustainable management of their resources, if they had security of tenure over lands which they have occupied.

State Identification and Recognition of Indigenous Cultural Communities' Ancestral Lands and Domains

With the issuance of Department Administrative Order No. 02 (DAO 02), series of 1993, it is presumed that the national laws now recognize that the state is not the sole source of legitimacy in land occupation. DAO 2 gives legal recognition to the reality that ancestral lands and domain exist, and that the indigenous people are not trespassers/"squatters" on lands which they have traditionally occupied, possessed and controlled over many generations. In this situation, ownership, and /or usufructory right is vested not through a positive act of the state but by the time immemorial possession and the resulting natural rights or *native title* of the occupants. Cited in the Department of Environment and Natural Resources Administrative Order No.2,¹⁰ the policy is intended to preserve and maintain the integrity of ancestral domains and ensure recognition of the customs and traditions of the indigenous cultural communities [and] to identify and delineate ancestral domain and land claims, certify them as such, and formulate strategies for their effective

⁸ From the Regional Master Plan for Forestry Development (November 30, 1991), "Strategies and Programs."

⁹ This is a seven year program of the DENR, funded by The World Bank. The land tenure improvement component is one of the important concerns of the program.

¹⁰ DENR DAO 2, *Rules and Regulations for the Identification and Recognition of Ancestral Land and Domain Claims*, series of 1993 (January).

management.¹¹ The DAO 2 document provides a definition of ancestral land and ancestral domain where:

Ancestral Domain refers to all lands and natural resources occupied or possessed by indigenous cultural communities, by themselves or through their ancestors, communally or individually, in accordance with their customs and traditions since time immemorial, continuously to the present except when interrupted by war, force majeure, or displacement by force, deceit or stealth. It includes all adjacent areas generally belonging to them and which are necessary to ensure their economic, social and cultural welfare.

Ancestral Land refers to land occupied, possessed and used by individuals, families or clans who are members of the indigenous cultural communities, since time immemorial by themselves or through their predecessors-in-interest, continuously to the present except when interrupted by war, force majeure or displacement by force, deceit or stealth.

DENR Requirement of A Natural Resource Management Plan For the Issuance/Awarding of Certificates of Ancestral Domain Claims (CADC)

The Department of Environment and Natural Resources (DENR) requires each community awarded with a CADC to develop a natural resource management plan. This is an important process that should fully involve the participation of the community in the preparation of a resource management plan.

Issues Arising From The Application of Ancestral Domain Concept

In the enthusiasm of government and some non-government programs to fast track and implement the awarding of certificates of ancestral domain claims --- issues arising from the inappropriate application of the ancestral domain concept have surfaced. These could create some unintended consequences for the community and the government, which may have implications for policy making and implementation.

The DENR's widespread practice of giving certificates of ancestral domain claims (CADCs) to units larger than the traditional communities may appear to be efficient in simplifying the application process. However, this may not be an effective strategy to foster sustainable resource management. It has been observed that the procedure for application may not always start at the level of the specific local community occupying the domain. A people's organization (PO), or even

¹¹ The granting of recognition to ancestral land rights has basis in three laws. The first, in the 1987 Constitution, which provides for the recognition and protection of the rights of indigenous communities and their ancestral lands to ensure their economic, social, and cultural well-being. The second legislation is Executive Order No. 182 which gives to the DENR the power to exercise exclusive jurisdiction on the management and disposition of all lands of the public domain. Lastly, R.A. No. 7586 referred to as The National Integrated Protected Areas System Law or NIPAS, giving due recognition to ancestral domain and customary rights in designated protected areas while stressing the importance of indigenous communities role in biodiversity protection.

the local government unit (LGU) can submit a claim in the name of the whole *barangay*¹² or even the municipality, which is not necessarily equivalent to the socio-cultural definition of the area covered by the citizens of a domain. An *ancestral domain* should generally cover only the territory of one distinct community.

The awarding of a CADC over an entire administrative area (i.e., the municipality), even before the determination of the sustainability of the ancestral domain management implementation plan, may create more problems of conflicting uses, resource competition, and weak ecological considerations in resource management practices.

This procedure of awarding a CADC already presumes a sustainable resource management system to be in place. However, the community-based procedure in determining whether jural rights, duties and obligations exist, oftentimes, does not seem to be followed.

To cite one example, where several communities have been included under one unit and awarded a CADC is the case of Sagada, in the Mountain Province. The municipality is not the traditional unit for resource management.¹³ As a consequence of this action, traditional communities will not be able to truly participate in the design of a natural resource management plan, if this procedure is not corrected immediately.

While the original intent of the DENR DAO 2, in the recognition of ancestral domain is premised on the indigenous communities' capacity to sustainably manage their natural resources, in a commonly held land, the Department of Agrarian Reform's (DAR) main thrust, on the other hand, is to formally award tenure over privately held land. This could inadvertently encourage the privatization of common property resources.

What are the Basic Characteristics of an Ancestral Domain?

The *effective control* over a territory is a singularly important identifying mark of an ancestral domain. This is a characteristic not necessarily found in all communities applying for a CADC.

DAO 2 simply prescribes possession/occupation as primary requisite for eligibility for a community to claim ancestral domain. By itself, this provision does not distinguish indigenous communities as to levels of integration, especially as these still possess concepts of territory and territorial control ---which are indicators that correlate positively with the observed sustainability of resource management.

¹² The smallest political unit of Philippine local government.

¹³ The municipality is a political unit of the government that has political jurisdiction over several distinct communities or *barangays*, which may not correctly represent the unique characteristics of the traditional resource management of each of these communities.

Furthermore, the maintenance of the integrity of the domain amidst outside threat (i.e., the rule of exclusion), and the biodiversity within the area, are evidence of territorial and cultural integrity. Sustainable indigenous resource management practices are indicators of an integrated sociocultural system that has been able to adapt to change.

Therefore, in determining the existence of an ancestral domain in a given community, the following are positive indicators:

- *The effective control and management of territory as against mere "possession and occupation."*
- *The existence of operational concepts of territory and resource control.*

Assistance to Communities Without Traditional Resource Management Practices

For purposes of administrative planning, the communities that cannot claim the same long settlement history and traditional resource management practices should be assisted in producing their own resource management plan. This should take into consideration the levels of integration existing in the communities -- to better assist them in improving their security of tenure. Where there is an absence or lack of ancestral domain concept and resource management practice, the role of the state should be in co-management. In cases where the communities' land tenure rights are secure, support services need to be enhanced and developed.

Some Lessons Learned: When Community-Based Socio-Cultural Structures Are Ignored

Consequences of the Breakdown Of Customary Rules

A consequence of the breakdown of customary rules on resource tenure is the general tendency for the creation of open access situations. Open access resources, where there are no defined "owners", have been observed to result in the erosion of the motivation to protect the resources, as illustrated in the following case.

In Haliap, Kiangang, Ifugao, the inability of villagers to enforce their customary claims and the inability of the local government to protect the indigenous community's rights, or to enforce the law, led to the eventual breakdown of institutions that govern the utilization of forest resources in the village.¹⁴ This resulted to institutional limbo which undermines the assurance and protection of the access to common property rights. Thus, eroding motivation to protect and maintain their indigenous agroforestry system (*muyong/pinugo*).

The ethic that no person in the community should be deprived of his/her right to have access to productive land from the communal domain, is the primary rationale for sustaining common

¹⁴ See Jesse Manuta in "Tenurial Arrangements and Forest Resource Management in Haliap, Kiangang, Ifugao." Bulletin. IESAM, Vol. 23, nos. 3-4, 1993.

property regimes. Common property resources act as safety nets for community members who lack inherited pond fields, particularly in the Mountain Province (Prill-Brett, 1993). The traditional rule which fosters equity in the access to productive resources may be undermined, should common property resources become privatized by individuals, as illustrated by the following case.

The conversion of communal forest to private property for exclusive family management began in the mid-1970s when the price of coffee was at its peak. Although the price of coffee has declined, the forest claimed during that time is still valued for logging and for future agricultural use. In the late 1970s and early 1980s, when coffee prices were still good, young men of the elite went to the remote forest area in groups and erected boundaries. Acting as witnesses for each other, they secured their claims by declaring the land for taxes in the Municipal Office. They planted a few coffee seedlings to mark the periphery of the parcel and since 1987, they have been cutting trees for lumber. Other people followed this example and a race began to develop a secure hold on land which had been perceived as "open access." Along with coffee came the advent of tax declaration and the grabbing of land by both external actors and members of the community elites. Areas previously considered communal became private property, with or without a coffee plantation. Usually, the new owners were already powerful people and they often reinforce their claim by asserting that the rights were drawn from the authority of the national, rather than customary legal system (from McKay, 1993: 53).

The use of legal pluralism is increasingly being applied by some well-connected community /municipal officials, community elites, or non-community members, to gain access to communal resources. Institutional factors aggravates the problem of open access resources and use patterns. It is common practice to establish local de facto use rights over common land by filing municipal tax declarations and paying nominal taxes.

Intervillage Resource Competition

The increasing incidence of resource competition between communities, also, has led to problems of boundary conflict, such as the recent case between Mayaoyao, Ifugao and Barlig, Mountain Province.¹⁵ The town officials and community members of Barlig asked the DENR Bureau of Lands to nullify the latest land survey made by the adjoining municipalities of Banawe and Mayaoyao, Ifugao, on the grounds that the new boundary ground markers identified by the neighbouring towns are claimed to be within the ancestral domain of Barlig, Mountain Province. This problem could have been avoided, if the survey was carried out with the participation of community elders who are knowledgeable about their ancestral domain boundaries.

¹⁵

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Some Unintended Consequences When Projects Devolve Management to Communities While Ignoring Community Social Structure

Projects or programs devolving management to community groups created for that purpose, while ignoring community structure, will create opportunities for a new level of elites to monopolize resources, as illustrated by the case presented above. This decentralization of management will not necessarily be any more successful in the objective of forest protection, while providing sustainable livelihoods than the previously centralized system.

Furthermore, the call for community initiatives and governments to devolve authority to community groups, or community leadership, can, in its enthusiasm for popular participation, overlook the very real issues of stratification and the structures of access to power and resources, which make up a community. Such community groups are frequently somewhat artificially created by the project, community organizers, or the allocation of cash and resources, rather than a genuine attempt to respond to community-identified problems on the part of the members. It is unlikely that new systems of management structures can be successfully introduced within the community management paradigm, without incorporating and addressing the stratified and inequitable results of social and agricultural changes, as argued by McKay (1993:54). What is called the "community" may provide no substantial social basis for collective action. Rather, it may be a more geographic entity labelled as a *village* or *community* by external agencies for administrative purposes.

Resource Tenure and Ancestral Domain Importance to a CBNRM Research Agenda

The recognition of ancestral domain of indigenous communities is increasingly necessary to provide legal protection for indigenous communities in their claims on forest resources against outside forces, specially state interventions and commercialization.

The Cordillera Studies Center, at the University of the Philippines College Baguio, has proposed a research program, as a direct response to the urgent need to support and strengthen local activities on the development, operationalization and implementation of government policy toward recognizing land rights among indigenous peoples, and enhancing local capability to manage natural resources in a sustainable and equitable way. This will be carried out within the context of community-based participation with the communities' informed consent. The context of community-based resource management is within the framework of ancestral domain.

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ANALYSIS OF FISHERIES CO-MANAGEMENT ARRANGEMENTS: A RESEARCH FRAMEWORK

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Abstract

This paper describes an institutional analysis research framework which has been developed for the ICLARM/IFM Fisheries Co-Management Research Project. The aim is to provide a common analytical framework which will enable comparison between case studies, country research, and pilot-tested co-management models. This will allow data to be analysed in a systematic way and allow generalizations to be made about conditions which facilitate successful fisheries co-management. The research framework allows for the essential elements of an action situation to be identified and examined.

1. Introduction

The Fisheries Co-management Research Project is a collaborative project between the International Center for Living Aquatic Resources Management (ICLARM), Institute of Fisheries Management (IFM)-The North Sea Center and National Aquatic Resource Systems (NARS) partners in Asia and Africa. It is based on a mutual interest to gain practical experience in research on fisheries co-management. There are two components to the research:

- 1.1 Comparative case studies of fisheries co-management strategies on the basis of existing literature and country research.
- 1.2 Co-management models based on 1.1 and tested at pilot sites.

This paper describes a research framework which has been developed by the project to carry out the above research. The aim is to provide a common analytical framework which will enable comparison between case studies, country research and pilot-tested co-management models. This will allow data to be analysed in a systematic way and allow generalisations to be made about conditions which facilitate successful fisheries co-management. The framework is in draft form because it is anticipated that once it has been applied in the analysis of case studies and country research, there might be a need to modify and/or expand it.

This paper is divided into two main sections. The first section briefly describes the theoretical background to the research framework, exploring the concepts of common property, fisheries co-management, institutional analysis and rights and rules. For more detailed coverage of the theoretical background, readers are encouraged to consult the bibliography. The second half of the paper describes the framework itself.

2. Theoretical Background

2.1 Common property resources

The "commons" include natural resources, such as fisheries, wildlife, forests, irrigation waters and pasture lands, which by their physical nature are now owned by individuals but are shared by a community or group of users, such as fishers. The "commons" has come to connote inevitable resource degradation. Many accepted that fishery resources which are held in common are subject to overexploitation and degradation. The main rationale for this was based on Hardin's theory on The Tragedy of the Commons (Hardin, 1968) which concluded that "freedom of the commons brings ruin to all". The assumption was that when resources are limited and publicly owned, it is rational for each individual to overexploit them, even though this behaviour ultimately results in tragedy for the group (Acheson, 1989). Hardin's solution was either to privatise the commons or keep them as public property, to which rights of entry and use could be allocated i.e. privatisation or government control.

In more recent years, social scientists have observed that not all common property resources are subject to such a 'tragedy' and are not overexploited. This has led to considerable discourse on the subject and consequent rejection of the notion that it is the common property nature of the resource which is the problem. What is important is not the type of resource i.e. common property, but the property rights regime in combination with the resource it is subject to, namely open access, private property, communal property and state property. The following definitions are given by Feeny et al (1990) to describe these regimes:

Open access: the absence of well defined property rights. Access to the resource is unregulated and free and open to anyone.

Private property: the rights to exclude others from using the resource and to regulate the use of the resource are vested in an individual or group. They are usually recognised and enforced by the state and are usually exclusive and transferable.

Communal property: the resource is held by an identifiable community of interdependent users who exclude outsiders while regulating use amongst members. The rights are unlikely to be exclusive or transferable and are often rights of equal access and use. Some inshore fisheries and shellfish beds are managed as communal property. The rights of the group may be legally recognised or *de facto*.

State property: rights to the resource are vested exclusively in the government which makes decisions concerning access to the resource and the level and nature of exploitation.

This separation between the nature of the resource and the property regime it falls under shows that Hardin's theory was correct inasmuch as it predicted a situation of a common property resource under an open access regime. However, other property regimes can and have also led to overexploitation, indicating that the provision of property rights alone is not enough. New methods of management are being investigated, in an attempt to take on the best aspects of state

2.2 Fisheries co-management

Figure 1 Spectrum of co-management arrangements (adapted from McCay, 1993 and Berkes, 1994)



2.3 Institutional analysis

In conducting research on fisheries co-management we are essentially interested in understanding how rules affect the behaviour and outcomes achieved by fishers using fisheries resources. Institutional analysis, which focuses on the institutional arrangements, the set of rights and rules by which a group of fishers and government organizes resource governance, management and use in collective action situations, will provide the framework for the research. It should be noted that not every detail of institutional analysis will be discussed in this paper. The reader is encouraged to make use of the highlighted publications in the reference list for more specific discussion of several aspects of institutional analysis.

The purpose of institutional analysis is to separate the underlying rules (institutions) from the strategy of the players (organizations). Institutional analysis examines how institutional arrangements affect user behaviour and incentives to coordinate, cooperate and contribute in the formulation, implementation and enforcement of management regimes. When carrying out institutional analysis, it is also important to examine some aspects of organizations because their strategies can influence, or lead to change in, institutions.

Institutions are the "rules of the game" in a society and are affected by economic, social and political factors. Institutions can be both formal and informal, created or evolved. Any human interaction is governed by both formal rules (i.e. those that are written down) and informal rules or codes (i.e. those which everyone knows about but are not formalised in any way). North (1990) uses the analogy of American football to describe institutions. In football there are formal rules and usually unwritten codes of conduct which underlie and supplement formal rules such as not deliberately injuring a player from an opposing team. The effectiveness of the rules is determined by whether they are enforced, the cost of enforcement and the severity of punishment.

Organisations, on the other hand, are groups of individuals bound by some common factors to achieve particular objectives. The origin of organisations and how they evolve is influenced by the institutional framework and in turn organisations influence how the institutional framework evolves. Organisations can be political such as a local council, economic such as a cooperative, social such as a church, or educational such as a school.

In general, institutional arrangements are defined by authority relationships that specify who decides what in relation to whom. The institutional arrangements can be subdivided into several attributes: operational rules for governing resource use, collective choice rules for determining, enforcing and altering operational rules, and organizational authority relationships.

Ostrom (1994) states, "Action situations are perceived to be nested within at least three relevant tiers of action. Operational level actions are decisions which occur whenever individuals directly affect variables in the world by doing such things as harvesting products, worshipping at a forest shrine, planting seeds, building fences, patrolling the borders of a forest or feeding leaves to their animals. Collective choice actions constitute a group's decisions about operational activities, e.g., the actions taken at an annual meeting of a forest users' association to keep a forest closed for the harvest of a particular product except for a specified time. Constitutional choice actions are decisions about how collective choice actions will be made. An example is the resolution of a forest

users' association to create an executive committee that will meet once a month to determine joint activities to be undertaken. Constitutional choices are frequently made without recognition that they are indeed creating a future structure to make rules about an operational action."

Institutional arrangements are sets of rights that fishers possess in relation to the fishery and the rules that define what actions they can take in utilizing the fishery. In order to organize their harvesting, for example, fishers must develop rules to establish how rights are to be exercised. Rules give substance to rights, structure a situation, define the behaviour of the group members, and reduce conflict. Rules may create different incentive structures that affect cooperation or conflict among fishers. Rules structure human behaviour into four categories: compulsory, permitted, authorized and non-authorized (Thomson, 1992). The types of rules that are devised will depend upon the severity of the problem the fishers face, the level of information they possess, socio-cultural traditions, the extent of the bundle of rights they hold, the level of opportunistic behaviour, and the ease with which actions can be monitored and enforced. Rules can provide stability of expectations, and efforts to change rules can rapidly reduce their stability (Ostrom, 1990). It should be noted that the institutional arrangements fishers develop and use may not always be the same as formal laws and regulations. The fishers may develop institutional arrangements to meet their needs which are not recognized and legitimized by government. These informal or traditional rights and rules may be as or more important and credible to the local fishers than the formal fisheries laws and regulations.

The terms "rights" and "rules" are often used interchangeably in referring to the uses of natural resources. "Rights" refer to particular actions that are authorized (Ostrom, 1990). A right is a claim to a benefit stream that is consciously protected, in most cases by the state. The possessor of the right has the expectation in both law and practice that their claims will be respected through the assignment of duty to others who may interfere with the benefit stream (Bromley, 1991). To possess a right implies that someone else has a commensurate duty to observe this right (Commons, 1968). Rights define the uses which are legitimately viewed as exclusive and the penalties for violating those rights. The specification of a right does not define how the right is to be exercised. How rights are exercised are defined by rules. Rules define specifically what acts are required, permitted, and forbidden in exercising the authority provided by the right. For every right that an individual holds, rules exist that authorize particular actions in exercising the right. For example, a right provides the authority for a fisher to operate on a specific fishing ground. How the fisher exercises that right through the fishing activity is specified by rules which may dictate the type of fishing gear used or the time of year when the fishing gear can be used. Thus rules specify both rights and duties. The important aspect of rules in terms of institutional analysis is that they may create different incentives which affect cooperation among users. Schlager (1990) cited the example of two groups of fishers in an identical set of rights but with different rules determining how these rights can be exercised. These two groups may have different incentives to cooperate so that the result may be totally different outcomes. The more complete the set of rights, the less exposed the fishers are to the actions of others, and the less risk that the fishers face in organizing themselves in groups (Ostrom, 1990).

For common-pool resources, the most relevant day-to-day or operational-level property rights are "access" and "withdrawal" rights. These are defined as:

Access: the right to enter a defined physical property.

Withdrawal: the right to obtain the "products" of a resource; e.g., catch fish.

Individuals who have access and withdrawal rights may or may not have a more extensive set of rights which authorize their participation in defining operational-level rights or what is referred to as collective-choice actions. In regard to common-pool resources, these additional rights include management, exclusion and transfer. These rights are defined as:

Management: the right to devise operational-level rights of withdrawal.

Exclusion: the right to devise operational-level rights of access.

Transfer: the right to sell or lease all or part of the above collective-choice rights (Schlager and Ostrom, 1993).

The sources of the rights of access, withdrawal, management, exclusion and transfer are varied. These property rights may originate by government which explicitly grants rights to fishers. These *de jure* rights are given formal and legal recognition. Property rights may also originate from fishers. Such indigenous or *de facto* rights, devised and enforced by fishers, are not usually recognized by government. These two types of property rights may overlap, complement or conflict with each other. While *de facto* rights may eventually be given recognition by government, until they are formally legitimized, they are less secure than *de jure* rights (Schlager and Ostrom, 1993). While most authorities tend to ignore *de facto* rights, many have proven to be efficient and equitable in fisheries management.

Ostrom (1991) identifies three levels of rules which are all closely linked. Operational rules govern and regulate resource use. Operational rules directly affect the day-to-day decisions made by the fisher concerning when, where and how to harvest fish; who should monitor the actions of others and how; what information must be exchanged or withheld, and what rewards or sanctions will be assigned to different combinations of actions and outcomes. Operational rules can be formal (written, legitimized) or informal (unwritten, customary/traditional). In both circumstances they are understood by those to whom they apply.

Several kinds of operational rules have been identified (Gardner and Ostrom, 1991; Ostrom, Gardner and Walker, 1994). Position rules specify what position a fisher may hold. Boundary rules specify who can enter the fishery. Allocation rules specify the procedures or actions for harvesting. Authority rules specify the authorized actions fishers may take independently. Scope rules specify the characteristics of fish that can be harvested. Information rules specify the information that fishers must reveal to others. Aggregation rules specify the procedures that fishers must follow for making decisions which involve multiple individuals. Penalty rules specify punishment for non-compliance. Payoff rules specify the rewards or penalties that may be assigned to certain actions or outcomes. Input rules specify fishers requirements in terms of time, money and/or materials for management and participation.

Ostrom, Gardner and Walker (1994) state that in the IAD methodology, "... one has a conceptual tool for inquiry about how rules affect a given situation. For each variable identified in the action situation, the analyst interested in rules needs to ask what rules affect the variable as specified. For example, in regard to the number of participants, the analyst asks: Why are there N participants? How did they enter? Under what conditions can they leave? Are some participants forced into entry because of their residence or occupation?" "Answers to these sets

of questions are formalized as a set of relations that, combined with the structure of a physical world and the type of community involved, produces the particular values of the variables of the situation." Ostrom, Gardner and Walker (1994) further state that "... a second advantage of examining the rules that directly affect ... an action situation is that doing so leads to a relatively natural classification system for sets of rules. Classifying rules by what they initially affect enables us to identify rules that all directly affect the same working part of the situation."

Operational rules are neither self-generating nor self-enforcing. Institutional arrangements are needed to adjudicate conflicts, enforce decisions, formulate and change operational rules, detect and sanction against rule violation, and hold officials accountable to users. These institutional arrangements are called collective-choice rules (Tang, 1992). These are the rules used by fishers, their officials, or external authorities in making day-to-day decisions - the operational rules - about how the fishery should be managed. In a broad sense, collective-choice rules include qualifications for participation in the management organization and whether membership is compulsory. They state what proportion of the group of fishers must agree before a rule may be adopted. Of critical importance are the arrangements for monitoring and enforcing compliance with the operational rules and for settling disputes.

There may be multiple levels of collective-choice entities depending upon the situation. In some situations only one entity, such as a fisher's association, may be constituted to adopt and enforce their own collective-choice and operational rules. In another situation, multiple collective-choice entities, at national, regional and/or local levels, may subject fishers to multiple sets of operational rules. For example, national-level regulations may overlap with local-level regulations which may overlap with customary or traditional practices. Different levels of collective-choice entities may be constituted to deal with problems of different scopes. Issues of coordination and control must be addressed when multiple levels of collective-choice entities are in place (Tang, 1992).

Finally, constitutional-choice rules affect operational rules by determining who is eligible to participate in the system and by establishing the process and rules by which collective-choice rules are created, enforced and modified. Constitutional-choice rules include, for example, the national fisheries policy and legislation which establishes a national fisheries agency and the fisheries administrative and management structure. This national institution has the mandate to empower lower level institutions to establish rules.

Ostrom, Gardner and Walker (1994) state, "Action situations are also linked across several levels of analysis. All rules are nested in another set of rules that, if enforced, defines how the first set of rules can be changed." "What can be done at a higher level will depend on the capabilities and limits of the rules at the level and at a deeper level. Changes in the rules used to order action at one level occur within a currently "fixed" set of rules at a deeper level. Changes in deeper-level rules usually are more difficult and more costly to accomplish, thus increasing the stability of mutual expectations among individuals interacting according to a set of rules."

Operational or working rules are nested within collective choice rules which are in turn nested within constitutional rules. In other words, the rules affecting operational choice are made within a set of collective choice rules that are themselves made within a set of constitutional choice rules. To further complicate matters, all levels of rules operate at different

levels: community, district, province, national, regional, and international. This means that the constitutional choice rules for a micro-setting are affected by the collective and constitutional choice rules for larger jurisdictions. A full understanding of behaviours and outcomes in managing a resource is only possible when information is analysed on how institutional arrangements at the operational level (resource use, monitoring and enforcement) relate to institutional arrangements in collective choice (policy, management and adjudication) and constitutional choice (governance, adjudication and modification).

Institutional arrangements are not organizations, and may not be associated with a formal organization. Examples of institutional arrangements operating independent of any formal organization do exist (Schlager, 1990). Yet, organizations are important since they can serve to operationalize institutional arrangements.

A fishery management system may involve several discrete organizations, both formal, that is legitimately recognized, and informal, and the organizations may perform different management and service functions at different levels of management. There can be a variety of organizational forms for managing and governing the fishery which may range from fisher's organizations, to cooperatives, to nongovernmental organizations, to government sponsored organizations (Pollnac, 1988). The organization will establish an agenda and goals which are to be achieved. This may include an identification of the problem or issue to be addressed and management and adjudication procedures. The authority system to ensure that fishers expectations are met is normally inherent in the organization. The analyst must recognize the mixture of organizations, both governmental and nongovernmental and internal and external to the community, and be able to identify the expansion and contraction of their roles under a co-management system.

A group of fishers can be regarded as organized to perform fishery management functions whenever it shares common understanding about:

- (a) who is and is not a member;
- (b) the rights of fishers to access and use the fishery as conveyed by membership;
- (c) how decisions are made concerning the development of coordinated strategies of managing the fishery;
- (d) leadership roles;
- (e) membership responsibilities to sustain the organization; and
- (f) how conflicts are to be resolved (Ostrom, 1992).

3. Institutional Analysis Research Framework for Fisheries Co-Management

Based on the theoretical and conceptual framework described above in Section 2, an analytical framework has been developed for use by project researchers on fisheries co-management. The purpose of the framework is to describe and characterise the key factors which influence the institutional and organisational aspects of fisheries co-management arrangements. Such an analysis can then be used to make generalisations about the type of co-management arrangements appropriate for different situations. In particular, the analysis would enable:

3.1 The identification of the *existing property rights system* in order to determine who defines rights to exploit the resource, who has access to the resource and whether any of these rights are transferable.

3.2 The *scale and level of user group involvement* in order to determine the ways in which user groups do or can participate in co-management. Scale refers to the types of tasks which can be carried out by user groups, whilst level refers to the political level at which user groups are involved such as local, regional or national. Scale is related to level in the sense that different tasks can be carried out at different levels.

3.2 The *nature of the representation of user groups* in the decision-making process in order to determine the participants in the co-management arrangement, which user groups are legitimate participants in the decision-making process and who can claim rights to participate (eg. fishermen, fish processors, consumers, environmentalists).

3.4 The *type of management organisation* (existing or possible) in order to determine the type of co-management arrangement most appropriate for a particular fishery.

Ostrom, Gardner and Walker (1994) state, "At the conceptual level of a framework, theorists identify the broad working parts and their posited relationships that are used in an entire approach to a set of questions. Frameworks help to organize diagnostic and prescriptive inquiry." The institutional analysis research framework provides for a structured approach to document and evaluate the origin, current status, operation, impact and performance of fisheries co-management institutions and for designing modified or new co-management institutions. Oakerson (1992) has stated that, "Such a framework must be specific enough to offer guidance in the field, yet general enough to permit application to widely variable situations." The framework allows for the essential elements of the action situation to be identified and examined. The research framework is used to collect and organize information on key contextual variables which characterize collective action situations at multiple levels. The same set of contextual variables are used to describe and analyse all situations. These contextual variables will take on different values in different situations. By utilizing the same set of contextual variables, it is possible to conduct a systematic and comparative analysis of diverse situations and identify relationships among variables for evaluative, diagnostic and design purposes. As an evaluative tool, the framework can be used to describe a collective action situation. As a diagnostic tool the framework can be used to prescribe solutions to modify an action situation. As a design tool the framework can be used to develop and implement a new action situation (Oakerson, 1992). It should be noted that the framework is not a causal model in which data is imputed and an output is generated. Rather, the framework is a method for logically arranging information, examining relationships among attributes and considering or describing outcomes. The framework can be used in different situations at varying levels of complexity and completeness as required.

The research framework is adapted from theoretical and empirical work on the Institutional Analysis and Development (IAD) framework developed by researchers at the Workshop in Political Theory and Policy Analysis at Indiana University, USA. The research framework uses concepts from economics, political science, anthropology, biology and law and relies of methods described by Kiser and Ostrom 1982, Ostrom 1986 and 1990, and Oakerson 1992. The theoretical foundations of institutional analysis are based on game theory,

neoclassical microeconomic theory, institutional economics, political economy, transaction cost economics, and public choice.

As specified for the fisheries co-management project, the institutional analysis research framework consists of three parts:

- (i) **Institutional Arrangements Analysis:** This component links contextual variables characterizing key attributes of the resource (biological, physical) and resource user (technology, market, social, cultural, economic, political) with the local fisheries management institutional arrangements (rights and rules). The contextual variables are referred to as a set since each is composed of a number of attributes. A causal relationship exists among and between the contextual variables, the local institutional arrangements (the focus of the analysis) and the resulting transactional (action) situations (Figure 2). The local institutional arrangements, structured by the contextual variables, affect the actions of the resource users by shaping the incentives and disincentives they face to coordinate and cooperate in resource governance, management and use; the incentives, in turn, shape the patterns of interaction that result when resource users select and implement fishing strategies; these interactions result in outcomes. These outcomes may, in turn, affect other outcomes. Time is a critical element. All the contextual variables can change through time. This causes change in institutional arrangements which, in turn, affects incentives, patterns of interaction and outcomes.

The six sets of contextual variables are:

- a. Fisher or community institutional and organizational arrangements;
 - b. Biological, physical and technological;
 - c. Market (supply and demand);
 - d. Fisher, stakeholder and community;
 - e. External institutional and organizational arrangements; and
 - f. Exogenous (macroeconomic, social, political, natural).
- (ii) **Institutional and Organizational Performance:** The outcomes of co-management institutional arrangements can be evaluated in terms of performance, that is, the meeting of management objectives and the impact on the resource and its users. Performance can be evaluated in terms of different criteria such as sustainability, efficiency, equity, replicability, adaptability, and manageability.
 - (iii) **Characteristics of Successful Fisheries Co-management Institutional Arrangements:** The most important aspect of this analysis is the specification of what conditions bring about successful long-enduring, locally-sustainable and self-governing fisheries co-management institutions. From the analysis we can identify a list of principles and propositions about conditions for the development and sustainability of effective fisheries co-management institutions.

The three parts of the research framework build on each other. The first part provides a framework for describing what is occurring in the collective action situation and specifying relationships between organizational and institutional arrangements. The second part is an assessment of how well the management institution is performing and what are its impacts. The

third part is a determination of what characteristics or conditions of the management institution lead to successful co-management. For example, once described, a performance evaluation of a co-management institution may conclude that it is biologically sustainable but not equitable. As a result those attributes of the action situation which lead to sustainability can be identified and used to develop conditions for successful co-management institutions. Those conditions which lead to inequity can be identified and prescriptions made to improve the situation.

The analysis of an action situation focuses on how rules combine with various contextual variables to structure the action situation and to generate particular types of outcomes. Implicit and explicit assumptions about rules and the contextual variables all influence the way an action situation is analysed (Ostrom, Gardner and Walker, 1994). The institutional arrangements analysis begins with an identification of variables affecting the action situation; the institutional, biophysical, technological, market, socio-cultural, economic, and political attributes and conditions of the resource users and the resource. These variables form the context within which fishers and other resource stakeholders coordinate and cooperate to establish institutions and organizations to govern, manage and use the fishery; from which emerges some patterns of interaction. Patterns of interaction result directly from the mutual choice of strategies by members of the group. These patterns of interaction result in outcomes.

In analysing institutional arrangements, the basic strategy is to separate and dissect the parts of the action situation - contextual variables, incentives, patterns of interactions and outcomes (Figure 2); identify and collect data on the attributes and conditions of each part; and examine the relationships between and among the attributes and conditions of each part. The purpose of dissecting the action situation is to examine relationships between and among the parts. Each part of the framework has a causal relationship with other parts, some stronger and some weaker depending upon the involvement of human choice in the relationship. Biophysical and technological attributes can have a direct affect on outcomes, for example, high levels of fishing effort can lead to overexploitation, regardless of whether or not institutional arrangements are in place. Institutional arrangements, on the other hand, have an indirect affect on outcomes as they lead to changes in human behaviour and choice, which affect interactions and outcomes (Oakerson, 1992). Different combinations of these parts can be examined depending upon the situation. These relationships can be analysed forward or backward depending upon if one is using the framework as an evaluative, diagnostic or design tool. Explicit and implicit assumptions about the relationships help structure and guide the analysis.

The various biophysical, socioeconomic and institutional attributes of the contextual variables which may affect collective action situations are identified. These attributes include who is involved in a situation, what their stakes and resources are, the types of actions they can take, the costs of those actions, what information is available to them, how much control individuals can exercise, how individuals and actions are linked to one another and to outcomes, the outcomes that can be achieved through what actions, and how rewards and punishments are allocated to particular combinations of actions and outcomes. Similar to the various parts of the action situation described above, the attributes are interrelated, a change in one attribute may create a new structure of incentives, resulting in different outcomes. Based on the contextual variables, one tries to explain or predict the patterns of relationships and the interactions and outcomes that are most likely to occur for an action situation, given the incentive structure. These explanations and predictions for what is observed are then verified in an empirical setting. The performance of the outcomes are then evaluated using established criteria (Ostrom, 1990; Tang, 1992; Ostrom, Schroeder and Wynne, 1993).

The institutional arrangements analysis framework can be used as an evaluative and diagnostic tool by working backwards through the relationships (Oakerson, 1992). Thus, the analysis focuses on outcomes. What is happening with the fish stocks? Are they increasing, stable or decreasing? Are returns from the fishery increasing, stable or decreasing? Are they being distributed equitably among the users? Is the quality of life of the fishers and their families improving, stable or worsening from previous years? The next question is why? Oakerson (1992) states, "A first order answer can be obtained by examining patterns of interaction among resource users. Are members of the community competing with one another to maximize their individual 'take' from the commons? The inquiry cannot stop, however, with patterns of interaction. The question of why recurs. Second-order answers depend on how ..." contextual variables, together with institutional arrangements, jointly affect patterns of interaction. Do fishers face a high level of uncertainty over fish availability and are they highly dependent upon the resource with limited livelihood options which would provide an incentive for low compliance with rules and non-conforming behaviour?

"Outcomes disclose the effect of a difficulty that is manifested behaviourally in patterns of interaction" (Oakerson, 1992). The reason for the difficulty is that the institutional arrangements do not adequately address the problems generated by the contextual attribute, for example, the biophysical characteristics of the fishery. This "lack of a good fit" between the biophysical attributes of the resource and the institutional arrangements used to manage and govern its use leads to a non-optimal incentive structure resulting in counterproductive patterns of interaction and undesirable outcomes (Oakerson, 1992).

The framework can also be used as a design tool to modify or develop collective action situations. Design requires the analyst to work forward through the framework. The analyst must identify key contextual attributes and what problems exist in the community. The analyst then evaluates what institutional arrangements are needed to address these issues. This is followed by a series of questions such as: What incentives for interaction will these institutional arrangements produce? What strategies will fishers select based on the incentives? How will this affect the resource and the fisher?

In a short-run analysis of an action situation, the contextual variables are assumed to be unchanging. Over a longer period, however, change will occur in them. Yields may increase, gear type may change or the day-to-day rules may be restructured. A dynamic element can be introduced into the framework. One approach treats institutional changes as exogenous; the aim is simply to understand how a series of changes in resource attributes or institutional arrangements affects patterns of interaction and outcomes. Another approach examines long-term relationships between attributes and institutional arrangements in an iterative and causal fashion. For example, outcomes can affect patterns of interactions resulting in a process of learning by the fishers; causing, in turn, individuals to modify their strategies. These relationships can be traced through the framework to identify factors which cause the strategies to change (Oakerson, 1992).

4. The Research Framework

The following sections describe each of the main framework components in more detail. These sections focus on what are considered to be the key attributes which affect incentives and patterns of interaction in a fisheries co-management situation. It should be emphasised that the

attributes are not definitive and might vary according to situation. As research gets underway, other key attributes might be identified and existing ones rejected. However, the purpose is to focus research on critical attributes to ensure that considerable time is not spent collecting an exhaustive amount of information which ultimately turns out to be of little use for diagnostic or prescriptive purposes for fisheries co-management.

4.1 Institutional arrangements analysis

(I) Contextual variables

(a) Biological, physical and technological attributes.

Problems and constraints over resource use most often originate in the biological and physical attributes of the resource and in the harvesting technology used. The nature of interactions among fishers are commonly structured by the biophysical and technological environment of the fishery. Fishers vulnerability to scarcity and uncertainty in fish supply and its effects impact upon their incentives to engage in collective action. Collective action situations have been shown to develop when a group of individuals are highly dependent on a resource and when availability of the resource is uncertain or limited. If the resource availability problem is repeatedly experienced, such as low or no catch, and if it exists within a single community of users, the fishers are likely to develop institutional arrangements to deal with the problem. To understand the actions fishers have taken and the institutions that they have developed requires an understanding of the fishing grounds, fish stocks, fishing activity, boundary conditions and fishing technology. Key questions to be considered are shown in Table 1.

Oakerson (1992) has identified three considerations for analysing these attributes:

- The relative capacity of the fishery to support many fishers simultaneously without mutual interference and/or without diminishing the aggregate yield of the fishery for the group (subtractability). The harvesting activity of an individual fisher subtracts from the amount of fish available for other fishers to withdraw. The catch of one fisher affects the amount of fish that can be harvested by other fishers utilizing the same fishing ground. Oakerson (1992) states, "The analysis should specify as precisely as possible the 'limiting conditions' that pertain to natural replenishment or maintenance of the resource. Physical limits established by nature or technology provide critical information for devising rules to maintain jointly beneficial use."
- The degree to or relative ease with which access to the fishery is limited (exclusion). The physical nature of fishing grounds means that exclusion (or limiting access) of fishers is both difficult and costly. A single fisher would find it difficult to exclude other fishers, therefore, fishing grounds are subject to joint use. Oakerson (1992) states, "Two types of exclusion can be distinguished: (1) access may be fully regulated on an individual basis, or (2) it may be partially regulated and applied only to those outside the immediate community. This distinction is related to the potential exposure to increases in demand. Within a definite community of users, increases in aggregate demand derive mainly from expanded operations. If there is open

access, however, increases in the number of users can also contribute to an increase in total demand on the resource."

Thus, a fishery is characterized by high levels of interdependence among fishers. The action of one fisher affect the actions and outcomes of other fishers. These interactions can lead to conflicts among fishers over space and amount of fish (Schlager, 1990).

- The spatial boundaries of the fishery, which determine the minimal scale on which effective coordinated resource management can occur (indivisibility). Physical boundaries having to do with divisibility of the fishery derive from nature, human design and technology. Fishing gear type, terrestrial and oceanographic features, customs, culture, government, organizations and scale all dictate the division or partitioning of the fishery into smaller units for management purposes (Oakerson, 1992).

The basic institutional forms for fisheries management are fundamentally shaped by these three characteristics of the resource. In addition to the above, two other concerns are important. Technological problems occur when fishers physically interfere with each other in the fishing activity. Gear conflicts may occur or the placement of gear may interfere with the flow of fish, often referred to as crowding. Assignment problems occur when fishers, desiring to fish the most productive spots, fail to allocate themselves efficiently across spots, leading to conflicts (Schlager and Ostrom, 1993).

If the attributes of subtractability and exclusion are arranged in a simple matrix, four types of goods can be identified: (1) private goods, (2) public goods, (3) toll goods and (4) common pool goods (Savas, 1987; Thomson, 1992; Tang, 1992).

- If a resource is consumed individually and it is possible to exclude some people from access to the resource, it is a private good. An example of this is a fish consumed by a fish farmer which has been produced in her fish pond on property that she owns.
- Public goods are those to which access cannot be easily controlled (exclusion is infeasible), especially free riders, and consumption is joint. An example of this is improved environmental quality in a region, such as air, resulting from maintaining the environmental health of the fishery.
- If a resource is consumed jointly but it is still possible to exclude access to it, such as for free riders, then it is called a toll good. An example of this is a water bottom area for clam harvest for a group of fishers who purchase use rights. The group harvests clams in the area together and exclude others from fishing in the area.
- Common pool goods are those to which access cannot be easily controlled and consumption is separable. An example of this is a small-scale fishery where there are a relatively large number of fishers using different fishing gear types in a situation where effective regulation is not feasible. Common pool goods can be subdivided into common property and open access goods. Common property goods are managed to some

extent. Access to and exploitation rates of the common property fishery are controlled by an identified group of users. Open access goods are not managed. Neither access nor exploitation are controlled.

A fishery could be either a private, public, toll or common pool good or a combination of these goods, depending upon the local biophysical, technological, and social setting. A fishery may be a private good at one point (such as along a shoreline) and a common pool good at another point (such as the coastal waters). Which type of good a fishery resembles tends to determine (within broad parameters) how social or elaborate the fishery management institution will need to be, and to what extent the government is likely to be involved in management. Ostrom (1990) points out that changes in biological, physical and technological attributes can potentially transform a resource from one type of good to another, which in turn is likely to lead to pressures for other basic institutional changes. Diverse biophysical factors, gradual trial-and-error experiments and negotiating lead to the emergence of site specific institutional forms, which continue to evolve over time. Characteristics of excludability and subtractability or jointness of consumption which characterize different types of goods strongly influence the incentives for fishers to use, manage and govern the goods.

Table 1: Biological, physical and technical attributes and indicators

Biological, physical and technical attributes	Key questions
Multi-species or single species fishery	What species are caught?
Migratory or sedentary fishery resources	Are the fish resources sedentary or migratory?
Level of stock exploitation	Have total catches been falling over time? Is catch per unit effort increasing or decreasing? What do stock assessments say?
Status of habitat	What is the % coverage of coral (where applicable) Are the fish and plant resources healthy? Is the water polluted?
Boundaries	Are there geographical boundaries for the fishery? How are they defined? Are there restrictions on who can enter the fishery? How are these defined? Are there any other boundaries relevant to the exploitation of the fishery? What are they?
Single or multiple gear fishery	What types of gears are being used?

Artisanal or industrial fishery ¹⁶	What gear and vessel types are there? What is the range of fishing operations? Can the fishery be divided into artisanal and industrial? How are these terms defined?
Level and mix of technology	What are the gear and vessel types? What are the technologies for preservation/processing of fish?
Dispersed or localised fishing patterns	Is fishing a seasonal activity? Does fishing take place in a localised area? Is fishing carried out offshore?

(b) Market (supply and demand) attributes

Resource problems are often market-based. Market attributes (price, structure, stability) can effect the incentives for resource use activities, effort levels and compliance with rules. These attributes include those related to the operation and function of the market and those related to fisher and fish trader relationships. Some of these market attributes include:

- stability of supply and demand in terms of price and quantity. Are there periods of scarcity of supply and/or high market demand? What effect does this have on price?
- market availability and location. Are there ready and consistent markets for product. Is the fishing community isolated? Do fishers sell primarily to local markets or are there regional, national and international markets?
- market structure. How competitive is the market at different levels within the market channel? How free is the flow of market information?
- credit/market relationships. Are there strong credit and marketing linkages between fishers and fish traders and between fish traders and other business people?
- changes in market. Have there been recent changes or "shocks" to the market in terms of structure, price or stability?

¹⁶ There is no standard definition of artisanal and industrial. Smith (1979) pointed out that it is more useful to talk about *ranges* of the technical and socio-economic characteristics of fishing activities. What is considered artisanal in one country may be considered industrial in another. For the purposes of the analysis presented in this paper, what is meant by the term artisanal is lower technology fishing with limited fishing ranges, often, but not always, for subsistence needs. What is meant by the term industrial is higher technology fishing with greater fishing ranges., predominantly for commercial purposes.

- market operation. Are there rules in terms of who can participate in the market and formal or informal operating procedures?

Key questions to be considered are shown in Table 2.

Table 2: Market Attributes and Indicators

Market Attributes	Key questions
Subsistence or market oriented fishery	What proportion of the catch sold/consumed?
Market structure	Are there many buyers? Are there many sellers? What are the power relations between buyers and sellers? Do women service other market segments than men? What are these?
Market orientation	Are the fish/fish products sold in local, domestic or international markets?
Value of products	Is the value of fish/fish products high or low?

(c) Fisher, stakeholder and community attributes

Fisher, stakeholder and community attributes can all affect incentives to cooperate. These attributes include religious beliefs and practices, traditions and customs, sources of livelihood, the degree of social, cultural, economic and locational heterogeneity or homogeneity, asset ownership, community mores, level of community integration into the economy and polity, and others. Whether individual attributes or in combination with others, each of these attributes potentially affects collective action and outcomes. General assumptions about fishers and stakeholders are related to how they behave both individually and in groups. Stakeholders, those individuals indirectly dependent upon the fishery for their livelihood, such as fish traders, processors and transporters, are also included since their relationship with fishers can provide incentives or disincentives for the fishers to cooperate (Table 3).

Institutional analysis involves attempting to understand the behavior a representative individual will adopt in a certain situation in light of their interests. Fishers and stakeholders "are assumed to be self-interested, rational individuals who operate within a context of rules which specify lawful and unlawful behavior. Individuals are also assumed to make decisions under conditions of uncertain information and to adopt maximizing strategies." (Thomson, 1992).

Some literature suggest two key attributes which lead to incentives to cooperate (Ostrom, 1990, 1992; Runge, 1992): (1) if a community of fishers exhibits a high degree of social, cultural and economic homogeneity in terms of kinship, ethnicity, religion,

interests, beliefs, customs, livelihood strategies, etc.; and (2) if there is a high dependence or reliance of fishers on the fishery for their livelihood and the number of alternative livelihoods available to fishers in the community is low. If the fishers are highly dependent upon the fishery and if the availability of the resource is uncertain or limited, fishers are more likely to facilitate collective action to deal with the problem.

Table 3: Socio-economic Attributes and Indicators

Socio-economic attributes	Key questions
Homogeneity/heterogeneity of users	How many ethnic groups are there among users? Are there differences in wealth, religion, gear types, residency amongst users? What are the vessel/gear/technology ownership structure? Who are the users/stakeholders (female/male)?
Dependence on the fishery for livelihood	What proportion of household/family income comes from fisheries?
Motivation of users	Are users exploiting the fishery for subsistence or commercial reasons?
Attitudes towards: risk, innovation, collective action	Are these attitudes: Strong/weak/indifferent? Is their heterogeneity in these attitudes? Is there any social/political mechanism, that prevent risk taking, innovation and collective action?
Level of information and knowledge on the fishery and management	What kind of knowledge (indigenous or scientific)?

(d) Fisher and Community Institutional and Decision-making Arrangements

Decision-making arrangements are concerned with how institutional arrangements, rights and rules, are made. There are three important aspects of decision-making: representation, relevance and enforceability.

- Representation is the extent to which users and stakeholders participate in rule making.
- Relevance is the extent to which the rules are considered relevant to the management problem.
- Enforceability is the extent to which the rules are enforced.

The key questions which are considered critical are given in Table 4.

Table 4: Decision-making arrangements and indicators

Decision-making Arrangements	Key questions
Leadership/power structure of user groups	What are the main characteristics of the leadership? Are the leaders considered legitimate? How are decisions taken eg. consensus, majority?
Main types of rules (operational, collective choice, constitutional choice) and at what level of applicability (local, regional, national)	What are the formal and informal rules on access rights to the fishery? What are the rules on harvesting rights? What boundary conditions (social, economic, physical, legal) apply to the regulation of the fishery?
Decision-making process for operational and collective choice rules	What are the main factors determining the way in which decisions are made for (one or two examples of) operational and collective choice rules? How are decisions made (consensus/majority/autocratic)? Which types of decisions are made through consensus/majority/autocratically
Level of representation in the decision-making processes at different levels (local, regional, national)	Who are the users/stakeholders? Are they represented in the decision-making process and how? What is the level of participation of user groups/stakeholders in the decision-making process? Are women represented and how?
Relevance of rules	What are user and stakeholder attitudes/values towards decision-making processes? What are user and stakeholder attitudes/values towards rule-breaking? How much legitimacy do the rules have with users?
Enforcement of rules and regulations/sanctions	How are formal and informal rules enforced? What sanctions are used? How do users perceive the utility of the rules? What is the level of compliance/non-compliance e.g. number of convictions, user attitudes; obedience/obstruction? What resources are available for monitoring and enforcement?

(e) External institutional and organizational arrangements attributes

Institutional and organizational arrangements external (international, national, regional, district or municipal levels) to the fisher or community level are relevant and can affect fisher or community institutional arrangements. However, the connection can vary widely. Some community-level arrangements may be subject to constitutional approval (constitutional-choice rules) to engage in collective choice. A community-level arrangement may be dependent on government for enabling legislation or enforcement of operational rules. An outside party may be needed to settle disputes between fishers. Fishers or communities may require outside assistance to facilitate and strengthen organizational capacity or to strengthen market forces. In some instances, fishers or community may need outside intervention to address problems outside its institutional mandate which impact upon local institutional arrangements and conditions (Oakerson, 1992). There may be nested multiple layers of external institutional arrangements, with and without formal linkages, at both governmental and nongovernmental levels.

(f) Exogenous (macroeconomic, social, political, natural) attributes

A variety of factors exogenous to the fishery resource, fisher and community may have an impact on fisher or community institutional arrangements. These are factors which are beyond the control of the fishers and community, and at times higher level entities. These are surprises or shocks to the community or management system, brought about by macroeconomic, social, political or natural occurrences or interventions which affect the survival of the institutional arrangements. They may include typhoons, civil unrest, elections and inflation. They should be viewed in an historical and dynamic perspective.

These factors can provide an indication of how well the institutional arrangements are functioning and surviving through its capacity or resiliency to accommodate sudden change. Bromley (1992) states that all large changes in exogenous factors threaten the capacity of individuals to learn about change fast enough to make adaptive responses. The faster and greater the change, the higher the probability that the institutional arrangements will not be able to respond rapidly enough.

4.1 (ii) Incentives to cooperate and coordinate

The contextual variables, and specifically the institutional and decision-making arrangements, shape the incentives for individuals to take certain actions (cooperate, engage in collective action, coordinate activities) to achieve desired outcomes. The focus of the analysis is on how rules are devised, what the rules contain, whether the users consider them legitimate, and whether they are enforced.

An individual member of a group relies on reciprocal behaviour from other members of the group regarding their adherence to the agreed-upon rules for management. An individual's choice of behavior in a collective action situation will depend upon how he or she weighs the benefits and costs of various alternatives and their likely outcomes. An individual's choices are often affected by limited information and trust in the actions of others which leads to uncertainty and by the level of opportunistic behavior or self-interest that individual fishers can expect from other fishers.

Uncertainty often creates obstacles for exchange and cooperation among fishers (Ostrom, 1991; Ostrom, Gardner and Walker, 1994). Individuals also have differing discount rates; many poor fishers, for example, attributing less value to benefits that they expect in the future, and more value to those expected in the present.

In some situations, individuals may have incentives or opportunities, resulting from unevenly distributed information and power among the group involved in an action situation, to adopt opportunistic strategies to circumvent the rules and to obtain disproportionate benefits at the cost of others (Runge, 1992). Three types of opportunistic behavior may occur: free riding, corruption and rent seeking. Free riders respond to incentives to engage in other activities while other members of the group work. Corruption can occur when incentives exist for rules to be changed for an individual through, for example, the provision of illegal payments. Rent seeking, the gaining of excess profits, can occur when an individual's assets, for example, property rights, increase in value through special advantages (Ostrom, 1992; Tang, 1992). The imperative of the group is to develop institutional arrangements which reduce or minimize transaction costs, reduce uncertainty and counteract opportunistic behavior.

For institutional arrangements to be maintained over time, it is important to develop workable procedures for monitoring the behavior of fishers, enforcing against non-conforming behavior with sanctions, and settling conflicts. The ease and costliness of monitoring rules devised to organize the fishing activity depend upon the physical nature of the resource, the rules-in-use, and the level of conformance to the rules (Ostrom, 1990). The number of times that non-conformance must be measured affects the cost of monitoring. The ease and cost of monitoring will also depend upon whether the fishers can monitor compliance themselves, as they fish or through self-monitoring incentives, or if they must establish more elaborate arrangements, such as external authorities.

Tang (1992) states, "Both transaction cost economics and institutional analysis are concerned with identifying appropriate institutional arrangements that can counteract perverse incentives inherent in various transaction situations. Whereas transaction cost economics approaches the problem by examining the characteristics of different transaction situations, institutional analysis explicitly identifies a higher level of analysis by delineating the contextual attributes that shape various action situations. At the contextual level of analysis, one examines how rules, physical attributes, and attributes of the community shape various action situations."

4.1 (iii) Patterns of interactions among resource users

While incentives to cooperate might exist, this does not guarantee that stakeholders and users will cooperate. Much will depend on the way resource users interact with each other and their behaviour both as individuals and as a group. (Oakerson, 1992). There is some overlap between incentives and patterns of interaction but the purpose in separating them is to assist the analyst in determine the likely reasons for a lack of cooperation when the incentives are thought to be in place.

To understand how fishers react according to incentives in the action situation, the analyst must systematically analyze the contextual attributes which combine to shape the incentive and constraint structure faced by the fishers. Given these contextual attributes and the incentives and constraints they generate for collective action, individuals make choices and develop strategies of action, from which emerges some patterns of interaction. Institutional arrangements do not

generate patterns of interaction, but they shape and generate the choices and strategies individuals make in relation to others members of a group (Oakerson, 1992).

Individual fishers will develop strategies to maximize their own self-interest within the bounds set by the institutional arrangements. Individual fishers will take advantage of the opportunities available to them and will comply with the rules to the extent required by those who enforce the rules (Thomson, 1992). Individuals will adopt strategies which change with the level of information available to them and the level of reciprocal interaction from others. An individual's strategy to cooperate will depend upon assurance that others will do likewise. Patterns of mutual action will emerge. Thus, in the first period an individual will monitor the behavior of others. If he observes successful collective action, he will revise his strategy in the next period to increase the level of cooperation and compliance. He will continue to revise his strategy over time based on new information about the resource and its users (contextual attributes), the degree of reciprocity, and the effectiveness of monitoring and enforcement.

4.1 (iv) Outcomes

Outcomes are produced as a result of patterns of interaction which are, in turn, the result of the strategies adopted by the fishers. The consequences of the patterns of interaction affect both those involved directly in the action situation and those indirectly involved. Various contextual variables can be associated with different outcomes. They may affect outcomes either positively or negatively depending upon the association. Patterns of interaction can produce biophysical, technical, social, economic, institutional and managerial outcomes. These include, for example, current resource yield, distribution of benefits and costs, livelihood and quality of life of fishers, knowledge of the fishery and its users, and degree of rule compliance. The specific outcomes may vary among fishers and communities and through time. Outcomes can be evaluated using different criteria. Of particular interest in evaluating outcomes is the question: How do predicted outcomes conform to evaluative criteria? (Ostrom, Gardner and Walker, 1994)

4.2 Institutional and Organizational Performance

The outcomes of co-management institutional arrangements can be evaluated in terms of performance, that is, the meeting of management objectives and the impact on the resource and its users. It is expected that in certain situations co-management institutional arrangements will perform better than other types of fisheries management institutional arrangements, such as centralized management. It is also expected that co-management will lead to more sustainable, efficient and equitable fisheries management.

The performance of co-management institutional arrangements can be evaluated at two levels. The first level of evaluation relates to overall institutional performance of co-management in meeting its stated advantages versus other types of management arrangements. These advantages include equity, more economical in terms of administration and enforcement, increased sense of ownership of the resource by users, self-management, higher degree of acceptability and rule compliance, improved information about the resource, improved social cohesion in the community, and more participatory (Pomeroy and Williams, 1994). A comparative assessment of the performance of different co-management institutional arrangements can be conducted at this level of evaluation.

The second level of evaluation relates to performance in meeting specific management objectives and impacts at the operational level. Each individual co-management system has objectives established by the participants, both resource users and government, that are to be achieved. Performance of these systems is conducted to determine how well they achieved the objectives and what the impacts of the management activity are on both the human and biophysical environment.

The most common evaluative criteria are efficiency, equity and sustainability. Other criteria can also be used. These abstract evaluative criteria must be converted into operational measures of value for use in appraising specific outcomes (Oakerson, 1992). Feeny (1992) has identified four methodological standards that operational measures of performance should meet. Reproducibility and reliability measures mean that the criteria should, for example, be able to be used by different observers to evaluate the same situation and get answers in close agreement. In addition, the measure should be applicable in different settings. "Validation may be demonstrated by showing that the operational measure that has been obtained inexpensively is highly correlated with an accepted and previously validated measure - the 'gold standard'". Lastly, a measure should be responsive and "... able to capture change, if in fact it has occurred, while providing stable scores for situations in which there has been no change."

Efficiency

There are various measures of efficiency. The first aspect of efficiency is whether fishers have achieved an optimal rate of use of the fishery (Oakerson, 1992). A less rigorous criterion is that fishers are not exceeding the sustainable yield of the fishery. A second measure of efficiency has to do with the flow of benefits resulting from the co-management institutional arrangements and the costs (such as transaction costs) of establishing and maintaining such arrangements. Ostrom, Schroeder and Wynne, (1993) state, "Economic efficiency is determined by the magnitude of the change in the flow of net benefits with an allocation or reallocation of resources." A minimal efficiency criterion is that the benefits of operating and maintaining such arrangements exceed the full set of direct and indirect costs. A comparative efficiency criterion is that the difference between the benefits and the costs of co-management institutional arrangements in one setting is the same as or greater than those of similar arrangements in a similar setting elsewhere (Ostrom, 1992).

As management processes are established to achieve particular objectives, the cost-effectiveness of the process compared to others has to be evaluated. One of the purported advantages of co-management compared to centralized management is that it will reduce transaction costs - the costs of information-gathering and processing, coordination of decision-makers/ user groups and regulation enforcement. Some of these costs remain fixed regardless of the management regime, such as information which is required by law. Other transaction costs vary with the quality of data and the process used to make decisions. Hanna (1994) points out that a centralized approach is often associated with low programme design costs but high implementation, monitoring and enforcement costs as the management regime may have little legitimacy with user groups. A co-management approach, on the other hand, is associated with high programme design costs as effective participation is time-consuming and therefore costly. However, co-management is likely to lead lower implementation, monitoring and enforcement costs as legitimacy of the regime is greater (Hanna, 1995).

Equity

Equity (fair treatment for all people involved in managing, governing and using the resource) has four main components (Hanna, 1995):

- (a) Representation: a more equitable management regime should represent the range of interests in the fishery and accommodate the full diversity of those interests.
- (b) Process clarity: the management process should have a clear purpose and a transparent operation.
- (c) Homogenous expectations: the extent to which participants have similar expectations concerning the management process and its objectives
- (d) Distributive effects: the management process should address the distributional changes embedded in the options under consideration

Equity can be measured in several ways. First, is the distribution of an individual's return on contributions to the management and governance effort roughly similar to the benefits they receive? Oakerson (1992) states, "The presence of inequities may lead to the collapse of reciprocity, resulting in less efficient use. Equity problems are apt to be aggravated by asymmetries (unequal proportions) among users, which create opportunities for some benefit at others' expense. This, in turn, can lead to costly conflict where all parties lose." Corruption and abuse of authority may contribute to inequities. A second measure is to determine if there are patterns of redistribution that fishers wish to achieve at this level of institutional arrangements. Questions to be asked include: (a) whether most fishers in the community are relatively satisfied with the institutional arrangements; (b) whether any fishers have been consistently disadvantaged as a result of the institutional arrangements; (c) whether the distribution of resources and wealth in the community has changed; (d) whether allocation of membership and rights in the organization is fair; and (e) whether individual's are receiving benefits based on differential abilities to pay.

Sustainability

Sustainability can be divided into stewardship and resilience. Stewardship, the tendency for resource users to maintain productivity and ecological characteristics of the resource, is divided into three components: time horizons, monitoring and enforcement. To promote resources stewardship, the management process should expand time horizons beyond the short term. A sense of stewardship will be more likely if the effects of the management regime can be monitored and where necessary, enforcement measures taken.

The other aspect of sustainability is resilience. This is the ability of the system to absorb and deal with changes and shocks. The three components of resilience are rule flexibility, structural adaption and market adaption. Rules should be flexible enough to respond quickly to changing conditions. The management regime should be able to adapt to both changes in the structure of the industry as well as changes in the market (Hanna, 1995).

Ostrom (1992) identifies several other criteria by which performance can be measured. One is concerned with the "match" of the membership of the management and governance organization and the fishers. Ostrom (1992) states, "A key factor that affects the long-run performance of an organizational arrangement is whether organizations can be established and maintained whose boundaries are roughly coterminous with those of the..." resource and its users. Mismatches can take two forms. One is a case where an organization is considerably larger than the fishery or the number of fishers. This might result in a total indifference to the problems of regulating the fishery. A second would arise where the organization is substantially smaller than either the territory of the fishery or number of fishers. If only a small number of the total fishers are involved in the organization then the gains from the arrangements would be minimized. Operational patterns of the organizational and institutional arrangements must be examined before concluding a mismatch exists.

A second measure involves the knowledge generated by fishers about the resource and about user preferences, benefits and costs. It is highly improbable that an organization could survive in the long-run and perform efficiently and equitably without detailed information about the characteristics of the fishery and use patterns. Without this information, rules to structure resource allocation would not achieve desired results. Thus, performance can be measured by the increase in information about the resource and the exchange of information among resource users.

A third measure is the level of rule compliance. The willingness of fishers to regularly follow operational-level rules reflects the viability of the rules as coordinating devices. This measure may be included with other measures in a group of performance criteria called "governance". In addition to the level of rule compliance other measures of governance performance may include overall reduction in conflict, existence of an effective conflict resolution mechanism, and existence of practical and implementable enforcement procedures.

4.3 Characteristics of Successful Fisheries Co-management Institutional Arrangements

The most important research task for an institutional analysis of fisheries co-management is to specify conditions and propositions for successful development of co-management institutions and which arrangements are most favorable for maintaining it. A number of questions need to be answered: Why are some co-management arrangements successful, while others fail? Why do some co-management arrangements endure for long periods of time? How can we improve the success rate for implementation of co-management arrangements?

The success of co-management institutional arrangements may be related to specific contextual variables or attributes, and these may affect the development and maintenance of the arrangements. The research framework provides a means to identify attributes which lead to successful co-management from those which lead to failure. For example, specific biophysical or fisher attributes, such as boundary definitions or fish stock characteristics or social homogeneity of the community, may be critical factors for success of co-management. They may be more critical than the institutional arrangements themselves. By identifying these attributes and then examining their relationship with patterns of interaction and outcomes, it is possible to specify conditions and propositions which can lead to successful development and maintenance of fisheries co-management institutional arrangements.

Over the last decade, research done at different locations around the world has documented many cases of co-management and community-based management in fisheries and other natural

resource systems. From the results, certain conditions are emerging which appear to be central to the chances of developing and sustaining successful co-management institutional arrangements. Ostrom (1990, 1992) and Pinkerton (1989) have made useful contributions to our existing knowledge about key conditions for successful fisheries co-management. These key conditions are discussed in Pomeroy and Williams (1994). These conditions should not be taken as complete as continued research is needed to reveal more about co-management arrangements and the factors leading to successful performance.

5. Conclusions

There are a number of research frameworks and alternative theories available for the study of fisheries co-management institutions. The institutional analysis research framework has been selected for use in this project because it is both specific enough in character for organizing inquiry but general enough to be useful in a wide variety of situations. The institutional analysis research framework has been used for analysis of diverse situations and no problems have yet been encountered. It is hoped that its use in this project will lead to further methodological strengthening of the research framework.

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COMMUNITY-BASED NATURAL RESOURCE MANAGEMENT

IN KADO VILLAGE, LAM DONG PROVINCE, VIETNAM

By: Luu Trong Hieu and Hoang Huu Cai

Abstract

Kado, an upland village in Lam Dong province of Vietnam, is characterized by a diversity in natural and socio-economic features. This diversity offers a good opportunity to study the community arrangement for natural resource use and management. The community-based approach of the research project includes the participation of local villagers in the process of designing and implementing research activities. The identification of target groups, based on criteria such as ethnicity, wealth ranking and gender, and the involvement of local stakeholders, especially local administrators, foresters and rural extension workers, help to promote the approach both in enhancing the capability and confidence of villagers and improving skills and attitudes of outside institutions. Certain technical and institutional solutions such as integrated farming, forest-garden, community woodlot and common land management have been tested and some have been adopted by the community. Impacts were also observed in the improvement of the research capability of the involved researchers in conducting action-oriented research.

1. Background to Project

1.1 Project Title

In December 1993, The International Development Research Centre of Canada (IDRC) agreed to support The College of Agriculture and Forestry at Ho Chi Minh City (CAF) with a grant for a three year research project entitled "Community-based resource management for the uplands" along with a similar project at the University of Hue. The Ministry of Education and Training and the Ministry of Science, Technology and Environment then agreed to the UAF proposition to conduct the project.

1.2 Location

The project decided to conduct research and development activities in a selected village called Kado, a typical village of the uplands of Vietnam in the district of Don Duong, province of Lam Dong. The project was started in May, 1994.

1.3. Research institutions involved

To cope with the interdisciplinary nature of the project, a group of thirteen researchers was convened. This group includes:

- eleven lecturers/researchers from different departments of the CAF.
 - an ethnologist from the Institute of Social Sciences in Ho Chi Minh City (ISSH).
 - a forester from the Don Duong Forest Enterprise (DDFE), Lam Dong Province.
- (The list of researchers is presented in Appendix 1)

At the beginning of the project, researchers from CAF had some experience in conducting FSR/D activities but the participatory approach was still a new direction. The ethnologist from ISSH has had some experience in conducting ethnography, but not in rural development oriented study.

The forester from DDFE was trained at UAF with a major in silviculture, is a native of the district and has good knowledge about local issues.

Therefore, although the group members have strengths in different professional fields, their capability to conduct action-oriented research was very limited at the beginning of the project and capacity-building for the researchers to conduct participatory research was considered an urgent need.

1.4 Key local problems which led to project

1.4.1 The diversified ethnic groups composition

Kado has the typical characteristics of an upland village in its diversity in both natural and socio-economic features. The village consists of six hamlets in which two hamlets are dominated by Kinh people, called Nam Hiep and Nghia Hiep and four hamlets occupied by ethnic groups, named Kado Cu (Old Kado), dominated by the Churu, Kado Moi (New Kado) dominated by K'ho, Taly 1 and Taly 2 dominated by Chil people. (The last was officially established as a separate hamlet in 1995). The diversity in ethnic composition offers a good opportunity to study the diversity of community arrangements for natural resource use and management.

Characteristics of the hamlets are presented in Table 1.

Table 1: Main characteristics of the ethnics in Kado village

Characteristics	Chils	Churu	K'ho
Hamlet	Taly 1 and 2	Old Kado	New Kado
Language group	Mon- Khmer	Malaya-Polynesians	Mon-Khmer
Agriculture	Shifting cultivation	Wetland rice	Wetland rice
Mode of Living	Nomadic	Sedentary	Sedentary
Parenthood	Matriacal	Matriacal	Matriacal
Origine	Highland	Coastal	Coastal

The diversified livelihood activities in the area are summarized as follows:

- (i) Homestead gardening: The average area of a homestead is about 2,000 - 5,000 sq. metres. Perennial crops include fruit trees, coffee, avocado etc., and annuals like corn, beans and some vegetables are planted in the areas around houses. Although the average size of homesteads does not vary much amongst ethnic communities, home gardening in Old and New Kado is more intensive than in Taly 1 and Taly 2, occupied by Chil people.
- (ii) Wetland rice cultivation: Most of the Churu and K'ho peoples have rice-fields in a lower area of the village. The rainfed rice fields are cultivated for one cropping a year, except in a small area which has an irrigation system invested by the program of

sedentarisation. However, the Chil people do not have many wetland rice fields for food production. This is partly due to the complicated process of the resettlement in the area of these ethnic groups.

- (iii) Shifting cultivation land: Shifting cultivation is practised mainly by the Chils. Despite large efforts of the sedentarisation program, up to May 1995, this is still an issue. In the cropping season, many people leave their houses and move to the field. They construct temporary sheds near the fields and live there to cultivate and to watch the crop during the cropping season.
- (iv) Animal production: The village has a total of about 809 cattle. The Churu and K'ho people who have rice fields prefer buffalos, as they can supply draught force. In contrast, the Chils prefer cows.
- (v) Off-farm activities: Contractual participation of many poor farmers in forest protection is considered an important off-farm activity. It is hoped that this can lead to forests being better protected and also create jobs and generate income for poor farmers. Job opportunities for farmers are also created by the forest enterprise in a program of barren land development through reforestation activities.

1.4.2 The fragility of the agricultural production systems

The area was developed in different historical periods with the common aim of sedentarisation of local people. However, the existing production systems are not sustainable, both in terms of bio-physical and socio-economic processes. A large proportion of local communities, especially Chil people, depend on the forest resource base for both cultivation land and other materials. Due to increasing population pressure, the traditional system of slash and burn cultivation is being changed, fallow rotation is shorter and severe land degradation has occurred. The adopted key concept of the project is sustainability, which is understood as social reproduction in the concerned community.

1.4.3 The influences of government interventions

Two strong stakeholders in the village are the People's Committee of the village and the DDFE. As in many other upland areas, the village has experienced different rural development interventions from the government programs. The most important is the program called 327/CT aiming at barren land development. However, guidelines for preparing sustainable natural resource development proposals under this program need improvement. It seems that there is a lack of adequate understanding of what the program is meant to accomplish, and by what means. The program has ended up primarily supporting reforestation by state forest enterprises, mobilizing local people in forest protection on a contractual basis and forest land allocation for forestry use. This raises the great question of considering the ethnic minorities in the village and the role of forestry in their production and social systems.

Relating to land allocation, it is agreed that, with respect to natural resource management, the privatization process in land use rights has gone too far in assuming that household use rights to forest lands is the best approach for local responsibility. This assumption creates difficulties in revitalization of traditional community-based management arrangements.

Although these interventions were not based on an in-depth study of the village conditions, they have great positive impacts on the living conditions of local people. The CBNRM project was therefore considered as a good opportunity to help the local community to monitor/evaluate these interventions and to assist local stakeholders at least to be aware of participatory approaches that might be helpful in their activities.

2. Research Objectives

Under the conditions presented in the previous section, the objectives of the project were settled as follow:

- (i) To understand and document agro-ecological and socio-economic conditions, and formal and informal community rules governing land and other resource use and management patterns in a small watershed area.
- (ii) To develop capacity at the community level for making gender-sensitive village resource management plans for the enhancement of village livelihoods and resource sustainability.
- (iii) To develop, in collaboration with villagers and farmers, improved resource use farming management systems thus leading to improved family welfare positions.
- (iv) To monitor and evaluate changes associated with practices that are adopted or adapted by the community or by individual families.
- (v) To build participatory research capacity of university staff in the area of local resource management.

It was thought that the above objectives could be met by a process of action-oriented research and training efforts.

3. Processes Followed in Conducting Research

3.1 Research problem identification

The ideal situation of action research is that research problems are identified by the community. The project tried to do so. However, in project implementation we have to adopt a negotiation process in which some statements about the issues raised in community meetings were validated. A scientist was allocated to develop research proposals and these were discussed in the planning workshop to refine the proposal. The core group members facilitated the research planning workshops. The project consultant sometimes was requested to help in evaluating or refining proposals, especially during the first year. The process of problem identification therefore followed the concept of "farmer back to farmer".

As first, some researchers did not believe in the approach and raised the question of the need of more "academic research". However, the PRA exercise in 1994 extracted good findings and a community action plan has convinced not only participating researchers, but also the community. This action plan was refined to fit with additional findings during the first and second

year. The negotiation process was good, as sometimes in our research context, activities occur because experts believe they are necessary. Impacts of this approach can be seen in the improved procedure of the national 327/CT project conducted by the DDFE.

3.2 The identification of target groups

The exploratory PRA exercise in 1994 and subsequent topical PRA in 1995 - 1996 helped to define different target groups. This was done along with problem identification. In fact, as the community is not homogenous, different groups in the community raised different research problems to address their needs.

Table 2: Prioritization of Problems of Different Ethnic Groups

Hamlet	Kadu Cu	Kado Moi	Taly 1	Taly 2
Ethnic Group	Churu	K'ho	Chils	
Priorities	1. Cash income 2. Health/education 3. Infrastructure 4. Sustainability	1. Cash income 2. Health/education 3. Infrastructure 4. Sustainability	1. Food security 2. Cash income 3. Health 4. Sustainability	
Sustainability issues	Water deficit	Drought	Erosion Limited cultivation areas	

The criteria for target groups identification included wealth, ethnicity and gender. However, there is concordance amongst criteria. In four studied hamlets there are three different ethnic groups and each group has distinctive farming systems. The Chils community was the poorest as compared with other groups. The following are some main research issues relating to different target groups:

- (i) Intensification of Wetland Rice: This issue was raised by the Churu people in Kado Cu hamlet. Interventions include support in soil analysis, seed and some other agricultural inputs for on-farm experiments.
- (ii) Improvement of Corn Production: This issue was raised by Chils who practice slash and burn cultivation. Local varieties of corn are used by Chils people as staple food, as their rice field area is limited. However, the production system in sloping land is extensive and the yield is very low.
- (iii) Access to credit: This research topic was developed at first by the Women's association of the village. The agricultural development bank of the district hesitated to give loans to poor farmers and had a misunderstanding about their capability to manage funds. Interventions include the establishment of a small revolving fund to test their ability in managing this micro credit system to develop some income generation activities.

- (iv) Sloping agricultural land technology (SALT): This topic was proposed by the research group to help farmers to develop land management and to prevent erosion.
- (v) Animal production: The issue of cattle raising was settled along with a similar intervention by the DDFE. However, poultry and pig production were raised by Women's Association.
- (vi) Forest Garden and Community Woodlot: The research was developed in line with the intervention called "forest garden" by DDFE. Farmers were involved in species evaluation.

3.2. Interests and priorities of different groups - Ethnicity and Gender Issues

The diversity in community composition with diversified interests and priorities created difficulties in setting the research agenda to address the issues. Conflicts sometimes occurred, as in the case of promoting un-confined poultry production and vegetable production, forest replanting by the DDFE and cattle grazing by local people. In a ranking exercise about small animals for household production, poor farmers (mostly women who do not have enough capital for commercial vegetable production) requested that the project promote un-confined poultry raising, but better-off families prioritised pig raising as this could produce manure. They also raised the question of damages created by poultry in vegetable gardens. Conflicts were also recorded in the case of overgrazing due to the reduction of grazing area. Cattle grazing in the area also created damage on DDFE forest plantations.

Although three ethnic groups in the village are traditionally matriarchal communities, differences in resource management between men and women in different hamlets seem to be related to resource use and the well-being status of the households. Similar activities for women in three hamlets were identified as follows:

Women and/or young girls do water collection for household use. In the case of the better-off group, improved water wells and electric pumping in Kado Cu, Kado Moi and Taly 1 help to reduce work load for this activity. In contrast, in Taly 2, where wells are deeper and electricity non-existent, they spend more time in water collection.

Farming activities of the Chils people in Taly 1 and Taly 2 are divided in the same pattern. Both women and men are involved in slash, burning is done by men, but land preparation, such as the removal of incompletely burned material is conducted mostly by women. Men dig holes, but women seed. Perennial crops are usually decided upon by men, but annual crops for home consumption are decided upon by women.

Women are involved in fuelwood collection. After a working day in their sloping field far from the house, women usually return home with back-baskets of fuelwood. Both young boys and girls are involved in cattle grazing. Off-farm activities were equally distributed among men and women.

4. Training

4.1 Target groups

According to the project objectives, training was considered to be a main component of the project. The training activities were focussed for three different groups:

- The community
- The research team
- Local institutions.

There was also some training for CAF students involved in research activities. This training is included under the category of research team.

As the general approach of the project is participatory, programs of training were designed according to the "participatory training" philosophy, to the need of the project and also to the issues raised from a training needs assessments.

The community benefited from special extension training activities which were incorporated in the implementation of different technical support as rice and corn production intensification, and cattle, pig and poultry production. For the research group, some methodological issues were discussed in different workshops, especially participatory approach, on farm research methodology. Some topics, such as research problem identification, report preparation and research documentation were informally organised in the form of experience-sharing workshops. For local institutions, the issues relating to the participation of local communities and community development were focussed. Topics of training were compiled as in Table 1.

Table 3. Training Activities Classified by Topics

Main Topics \ Benefited Group	Community	Local institutions	Research team
PRA method	+	+++	+++
Community Development method	+	+++	+++
Stakeholder Analysis	+	++	+++
Household Economics	+++	++	+
Biophysical inventory	+	++	+++
Nursery and plant propagation	+++	+	+
Corn production	+++	+	+
SALT techniques	+++	+++	+
Cattle raising	+++	++	+
Poultry production	+++	+	+
Rice production	+++	++	+

NB: Evaluation of training by different groups is as follows:

- + Need to be improved to address the group needs,
- ++ Good, +++ Very good.

A total of 22 researchers benefited from training activities. This number includes not only personnel involved in the CBNRM project, but also staff from other projects. Fifteen local government officials (at district and community levels), 6 foresters of the DDFE and 5 from the village Women's association benefited from the training sessions. Ten of them also participated in village training programs. A total of 15 students were involved in research and benefited from the training activities of the projects.

The total number of farmers who benefited from extension training programs was estimated at 300 person-days. This included 90 for rice production intensification, 40 for cattle raising, 30 for pig raising, 80 for poultry production. 30 for SALT techniques, 30 for woodlot. This training was organised in the form of workshops, field visits, participatory observation and study tours.

4.2 Effectiveness of the trainings

The PRA Training Course conducted in 1994 was considered to be the most important event. This training, for the first time, introduced participatory approaches to research, not only for CAF researchers but also for local collaborating agencies. Participants from local collaborating institutions included 3 from the Village People's Committee, 2 from the Don Duong Forest Enterprise and 1 from the District People's Committee. Follow-up and monitoring activities in the second and third year lead to the identification of the impacts.

4.3 Constraints

- The group recognised that because the community-based approach is in its infancy, and the role of local government bodies and forest guards needs to be redefined so that they may be used as agriculture and forestry extension agents. In fact, the DDFE personnel are involved in different activities to implement the national programs such as 327/CT and Sedentarisation.
- Women and disadvantaged groups were invited to many forms of training activities; however, their participation was still limited.
- Although training contents were related to local conditions, training needs have not been clearly prioritised to fit with the diversity of different interest groups.
- Monitoring and evaluation of training and extension programs have not been fully developed and implemented.
- There is a need to develop simple training and extension materials that incorporate indigenous knowledge, strategies and skills of local people.
- Although training sessions were informally well-implemented, there is a need to have a systematic training agenda and better collaboration with other local agencies dealing with extension activities.

5. Preliminary Research Findings

The three most important findings of the project are:

- The appropriateness of participatory approach,
- The capability of community groups in natural resource management,
- The national land allocation program and the need for common land management.

5.1 Appropriateness of Participatory approach in the Context of the Uplands in Vietnam

5.1.1 Local government versus the grass-roots:

- (i) Vietnamese society has a long tradition of communal action. As well, Article 8 of the Constitution of Vietnam (1992) attaches importance to participatory government: "All state organs, cadres and employees must show respect for the people, devotedly serve them, maintain close links with them, listen to their opinions and submit themselves to their control. All manifestations of bureaucratism, arrogance, arbitrariness and corruption shall be vigorously opposed".
- (ii) Although the participatory approach fits well with Vietnamese society, there is a need to train people for the realisation of the approach. It has been observed that participatory structures do still exist in the project area. Elected people's Committees can be found down to the village. However, vested on socialist principles and as a result of the presence of strong government or party-sponsored social organisations, "spontaneous" participation by the general public in planning processes is virtually non-existent. Traditional informal institution like "elders" in traditional villages, described in the past as having a decisive role in traditional ethnic minority communities, nowadays remain symbolically in some form of consultative committee. The project therefore considered the need to have the collaboration of local stakeholders such as local government, the DDFE and government-organised NGOs, such as the Women's Association.
- (iii) In this situation, the influence of strong stakeholders with different expectations need to be carefully taken into account in the realisation of a participatory approach. This raises the question of considering the ethnic minorities in the area. The idea of conducting participatory research without the consent and support of local secondary stakeholders is unrealistic. However, a careful stakeholder analysis will help to prevent any biases. Experience shows that good collaboration between the DDFE, local government, GO-NGO, local communities and researchers can be reached by a negotiation process. The realisation of the approach helps to enhance the capacity to negotiate of disadvantaged groups in the community and to raise awareness for local authorities about the capability of the community to participate. In fact, the DDFE and the People's Committee of the village now consider a participatory approach as an appropriate approach to bring local development towards self-help activities of the communities. The local people participate more and more in the process of decision-making. This could create favourable conditions for the emergence of the bottom-up approach to planning. Of course, more

efforts are needed for the creation of the policy environment to enable the realisation of a community-based approach.

Research and development activities dealing with the Women's Association in credit management were at first considered risky interventions. However, after two years of implementation, the results are promising. Strong collaboration amongst members was maintained and the activities of this institution to assist its members have been developed.

5.1.2 Technical Support versus Institutional Arrangement

During the first year, the project was mainly concerned with technical support. However, a lesson is that if we focus on technical only, then we would be tackling only half of the problem. The functioning of the community system is critical for the success of community-based approach. We do not wish to see a passive community that depends on external interventions. Assistance as local institutions capability building can help to develop self reliance of the community. The case of Women's Association is a good illustration of this issue.

5.2 The capability of community groups in natural resource management

- (i) At first, local authority raised the question of the capability of the local community, especially the grass root, to realize participatory work. Based on some superficial observations, some key informants pointed to their illiteracy or jumped to the conclusion that the inhabitants indulge in eating and drinking. They have feasts which cost a lot of money and time on occasions such as their ancestors' death anniversaries, weddings and festive days. Their affinity to drink affects their productivity and daily work. (Interviewee: A key informant from the LD Forest Guard). However, our observations showed a different situation. The community, be it of ethnic minorities, had undergone dramatic changes. New religions strongly influenced the mode of living. Farmers have multiple criteria for assessing technologies. This includes profitability, risk, contribution to food security, time taken to see a return on investment and labour requirement. In the context of our research project, the security of land tenure and the access to agricultural credit were also important.
- (ii) Good management capability was reflected in the case of a group of women who manage a small revolving fund. A strong communal collaboration and mutual assistance was also observed.

5.3 Land allocation program and common land management

The security of land tenure is an important factor for local farmers to adopt conservation farming. The national program of forest land allocation is therefore a step forward to enable community-based natural resource management and conservation farming to be realised. However, it seems that in implementing barren land development, the perspective of foresters and local government agencies is to regreen all idle and barren land; this could lead to conflict in resource use as local people with cattle need communal grazing area. The current process of

forest land allocation mostly emphasises land privatisation and therefore does not adequately treat the common land. In the situation of the eruption of traditional modes of resource management, these areas become open access resources which are easily depleted. Contractual forest protection and management systems were implemented, but areas of fuelwood collection and grazing continue to be mis-managed.

6. CBNRM Research Issues

We would like to mention here the three most important research issues relating to the CBNRM approach.

6.1 The need to understand and to document indigenous knowledge

In conducting participatory approach, we learn the role of indigenous knowledge. We have been concerned with local resource and appropriate technology, and the approach brings a better understanding that in local resource, indigenous knowledge is a very important component. These lessons help to change the attitudes of our researchers to let them fulfil the role of the facilitator in the development process. We also find that some of the indigenous knowledge had been eroded by external interventions as in the ways local people manage their water streams and maintain their "Yang-B'ri" ("Holy forests"). We hope to have good collaboration with social scientists to deal with this very important issue.

6.2 The need to understand development process

Thanks to the project, the idea of the necessity to integrate social sciences and humanities in rural development research, especially in social forestry, has been gradually recognized among agriculture and forestry scientists in our institution. Learning by doing, they have involved research projects for sustainable rural development, especially for the uplands, the mandate area of our institution. For the first time, they faced diversified situations, not only in terms of natural but also in socio-economic conditions. These diversities create the need of diversified modes of intervention that formerly used to be very uniform. Some of the improved techniques from the low land areas failed in the uplands, some were good in one commune but not good in others, and in each community, there are different social groups, with different problems and opportunities. Preliminary lessons help us to understand that we need to consider and to incorporate issues like gender, ethnic and wealth groups. However, not much Vietnamese literature scientifically treats these issues, and it seems that the authors tend to jump to conclusions without adequate justification. In particular, the evolution of the upland communities has not been well described in publication and old literature on ethnology of minority ethnic group published during the French colonisation period still dominates in the libraries and creates a biased view about the situation. An example can be found in our research in a community called Kado village where three different autochthone ethnic groups have their different modes of living.

6.3 Involvement of local government agencies

Recognizing the fact that the People's Committee of the Village and the DDFE are powerful actors in the life and economy of the community, the project tried to involve them in the different phases (from designing of activity up to monitoring and evaluation) of the project. The People's Committee sets regulations, collects taxes and fees. The DDFE manages the forest land of the

area. It also conducts rural development activities according to the national barren land development program set regulation.

An important lesson learned in working with local government is the need to improve the negotiation ability of the local community. The interests of local government bodies in many cases is much different with that of local people (eg. the government policy focusses on forest protection and reforestation, but the poor farmer thinks about food for him and his family when they cut down the trees). Therefore, the project activities should involve both of their interests, and never bypass the ideas of local officers. An inclusive stakeholder analysis will help to deal with the situation. The support of local government is very important as many activities cannot be implemented without this support. However, these activities need to be regulated to avoid creating more workload; the Chairman of People Committee of Kado village has complained about the time consumed when he is involved in project activities (such as many meetings, the conflict of time with his daily work, etc.).

7. Lessons Learned

7.1 Changing of attitudes of researchers and local strong stakeholders are more important than technical interventions:

This issue is very important in the case of the upland communities. During the "Green Revolution" period, techniques were developed in the low lands and for low land areas and were transferred to farmers by the system of *technology transfer*. The relationship was simple as it is the "technician-producer relation". In fact, our agricultural education system had been developed in this way: to train competent agronomists and foresters to guide or to direct the production process. However, new relationships gradually occurred especially in the "Renovation" period when the government reconsidered the role of the farmer in agricultural production process. Instead of a "technician-producer relationship", we are trying to change to a "developer-farmer partnership". In the last PRA exercises, even in the preliminary objective, attitude was not included. Now we have understood the need for developing researchers attitudes to make new relationships be realised.

Still we faced problems in understanding behaviours of the farmers in their decision making process. It seems that neo-classic economic theory cannot help to understand technical adoption by the farmers, and also to evaluate externalities like deforestation, soil degradation, social and environmental costs. We are now trying to construct models of institutional economics, and in this case, we need more information about history, institutional arrangements, norm and values and how these influence the decision process of the farmers. This understanding is important as it helps to avoid "stereotyping" in considering upland people, and to build up self reliance of the communities in managing their resources.

7.2 A better interaction amongst participating researchers in an interdisciplinary team

Researcher capacity building was both an objective and a by-product of the project activities. In fact, participating researchers have the opportunity of learning by doing from the development of the research proposals up to the evaluation of the project. Although researchers had involved

rural appraisal activities, participatory approaches were a relatively new approach for many CAF staff members. Before the start of the CBNRM/U project, the college had not paid enough attention to building action research capability in this direction. This is the reason why when funding stops, the work started is often not sustained. As far as the interdisciplinary organisation of the research, though researchers preliminary focussed on their specific fields of competence, we tried to cope with overlapping and interaction areas in an integrated way. This is not an easy task. Interaction and "negotiation" amongst researchers were maintained through different workshops to prioritize activities and to modify research proposals. The community action plans were used as the directive documents in these processes. Although researchers learned appropriate ways to generate information, and in fact they have collected important information, the analysis, documentation and report preparation phases were still weak. The technical assistant to the coordinator had to fulfill his responsibility in report preparation though project document.

Thanks to this project, many researchers in different departments of the CAF have had a chance to work together and share their experiences with each other. The realisation of a participatory approach needs a good team of researchers devoted to helping the local community in solving their problems. Enhancing the action-oriented research capability of participating researchers is therefore an urgent need. A community-based approach needs a comprehensive community analysis. The interactions amongst different participating researchers can increase the chances of success in developing and promoting technologies, if they clearly define constraints which have been neglected in the past and which can be overcome by appropriate policy intervention.

The participatory approach is theoretically easily accepted, but not so easy to realise. Experiences from three years of CBNRM/U project implementation show that appropriate attitudes are more important and harder to develop than skills. Workshops for idea and experience sharing in the last year created good impacts. The ideal situation is good media (as regular meetings or workshops) to create the environment for interdisciplinary interaction amongst researchers. In reality, due to limited time availability of project participants who already have heavy work loads and are involved in many activities, or participating in other trainings etc., such meetings were occasionally organised and therefore interactions were limited.

7.3 A better system of reporting and a network for experience sharing

A better system of reporting is badly needed. This can help core members to edit reports and to disseminate findings in a timely fashion. This is very important in case of high turnover of staff (go abroad for graduate studies or higher promotion, etc.). In future projects, a component of documentation will help to solve the problem.

7.4 A proper site selection and the role of the field-based assistant

The selected study site is appropriate to conduct comparative studies among different ethnic group. However, the physical distance between the CAF and project site, almost 300 km (a five to six hours trip), is also a big constraint because it is time consuming, costs a lot and researchers cannot often visit the site. In this case, the field-based assistant plays a very important role in project implementation and monitoring, as he or she is the contact person who keeps relationship between farmers and researchers who cannot visit the site very often.

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Many thanks have to be expressed to all contributors to the CBNRM project at CAF.

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THE JHIKHU KHOLA WATERSHED PROJECT

IN THE NEPALESE HIMALAYAS: APPROACHES USED

AND LESSONS LEARNED

By: H. Schreier, Sandra Brown and P.B. Shah

Abstract

Agricultural expansion into marginal lands and intensification in irrigated agriculture (triple annual crop rotations) are leading to rapid soil nutrient depletion, water shortages and water pollution. These processes were studied in the Jhikhu Khola watershed, one of the most intensively used watersheds in the Middle Mountains of Nepal. Forestry and livestock play a key role in maintaining agriculture and both systems are under stress. A combination of biophysical and community based socio-economic surveys were conducted to determine the status of the resources, and GIS was used to integrate and evaluate the data. The methods used in the research program have evolved from a heavy emphasis of biophysical surveys to a mixture of computerized monitoring and rapid participatory surveys. Using computer-based techniques proved to be very effective in integrating the information and in communicating the results. Good indicators have been identified to document degradation processes and rates of change, but the main research challenge is to rehabilitate degraded resources and to bring about changes in the degradation processes. Community based research approaches focussing on nitrogen fixing fodder trees and improved irrigation are examples which are being explored, and a major rehabilitation program on a degraded site was initiated in 1994. Such research is challenging and time consuming but the results obtained over the past two years are encouraging.

1. Introduction

The key issue in the Middle Mountains of Nepal is how to increase productivity within a subsistence system in a fragile and marginal environment, given the a rapidly increasing population. The Jhikhu Khola watershed project was initiated specifically to address problems associated with soil degradation and long term soil fertility declines. The watershed represents one of the most intensively utilized basins in the region and both agricultural intensification and agricultural expansion into marginal lands are occurring simultaneously (Schreier *et al.*, 1995). Over the past 15 years irrigated agriculture has evolved from an average of 1.3 rotations per year to 2.6 (Wymann, 1991, Shrestha and Brown, 1995) and water shortages during in the dry season are becoming the key limiting factor for further intensification. Agricultural expansion into marginal lands has resulted in the conversion of steep shrub and grass lands to rainfed agriculture, and this is leading to extensive soil erosion problems. The forests which expanded during the 1980's due to an intensive afforestation program initiated by the Australians (Griffin *et al.*, 1988, Gilmore and Fisher, 1991) are now playing a key role in sustaining agriculture, but forest biodiversity and productivity are declining. The forests provide timber, firewood, animal feed and organic matter for the community, and the latter is a key input into the agricultural system. The farming system relies on foreign aid as the main source of fertilizer, manure from the local animals is insufficient given the demand and feed shortages, and forest litter collected from the forest floor is resulting in long term soil fertility decline within the forest.

Are the nutrient and energy flows within this system out of balance? What are the symptoms and indicators that can be used to monitor the state of sustainability? How can we effectively rehabilitate watersheds? These are the main questions to be addressed in our project.

2. Goals and Objectives

The overall goal of the project is to examine the dynamics within the entire farming system which includes agricultural expansion and intensification; the status and role of the forest resources in sustaining agriculture and supplying timber, firewood, fodder and litter, the role of land management; and the impact on the well being of the people maintaining this system.

The specific objectives were:

- (i) Identify indicators that can be used to quantify degradation and measure sustainability.
- (ii) Determine the status of water, soil, agriculture, forestry, livestock, and human resources, and determine the key processes and direction of changes.
- (iii) Project and compare resource conditions under different growth scenarios.
- (iv) Identify approaches for effective rehabilitation of degraded resources and initiate demonstration sites to disseminate the research findings, experiences and information.

3. Processes followed in conducting the research

3.1 Background: The traditional approach in resource management is to first initiate an inventory of the basic resources and then set up a monitoring program to determine processes and rates of change. This approach is currently unpopular with funding agencies because inventories are costly and give little information on resource dynamics. Also, monitoring programs take a long time before useful data are generated. Alternative approaches that have become very popular in recent years are: participatory surveys, rapid rural appraisals, appreciative inquiry, etc. The advantages of these approaches are that you can rapidly gain a good overview of the resources and problems by relying on the indigenous knowledge. The disadvantages are that the information collected is often descriptive and highly dependent on the skills of the surveyor and the informers used in the survey. Our project started seven years ago and we utilized a mix of traditional and alternative surveys.

3.2 Approaches used : Two decisions were made very early in the project: 1. Geographic Information Systems (GIS) were used as a basic tool to integrate all information pertaining to the management of the natural resources; and 2. A watershed approach was used as the framework for evaluating the resource dynamics. GIS techniques are difficult to learn and are very time consuming to use effectively, but in the long run GIS is proving to be one of the most effective tools for data management, integration, display and communication of results. The watershed approach was used because it represents a very effective natural system for studying dynamic processes.

Multi-resource data for the analysis was collected and integrated using four different approaches:

- (i) Soil and land use inventories using aerial photo interpretation techniques and field surveys. This was done in two stages: A traditional soil survey and a fertility survey for specific land uses.
- (ii) Monitoring water resources, climate and soil fertility using a mixture of manual and automated logging devices.

- (iii) Participatory surveys in the form of structured and unstructured interviews.
- (iv) Using Hyper-media as a communication tool.

All four techniques have advantages and disadvantages, however, the combination of these techniques provided us with an opportunity to introduce new techniques and to modify the traditional approaches with the introduction of computer based technologies. The computerized monitoring and the GIS techniques provided a great incentive to incorporate younger people into the project and to expose professionals to the new approaches of data gathering, data evaluation, and communicating results.

Computerized techniques without a people focus will be ineffective and the key to the project has been working with an interdisciplinary team that has common goals and dedication to the project. This meant rethinking and retooling. The process is evolutionary, and the best advice is to start with a small core team. Build in a selective manner with the primary focus on compatibility and dedication of the people for the common goal of the project. This also means that farmers play a very central role in the survey and monitoring programs. Our project employs some 30 farmers in the monitoring program. This approach involves more than gathering information on indigenous knowledge by outside researchers. Local farmers become an integral part of the research. This not only provides some additional income for the local farmers but involves them in the research questions we are trying to address. Over time a trust is developed between the researchers and the farmers which has many mutual benefits. It facilitates on-farm innovation trials and paves the way for more effective socio-economic data gathering (Brown and Shrestha, 1995).

These techniques enabled information to be gathered on geology, soils, land use, land use change, hydrology, cultural and economic information, farm management, off-farm income and activities, population dynamics and water resource management. Over time this information was integrated into GIS which allows us to display the status of the resources in an interactive manner, develop scenarios and model key processes.

3.3 Training: A very important component in the project is education and training, and has enabled the project to built effective and vital linkages between national institutions and Canadian academic participants. We view training and education as a continuous process and we are adamant that training should incorporate some of the best computer based techniques. There should also be a long term commitment not only to introduce new techniques but for up-grading courses because many techniques are complex (GIS, Hypermedia, data loggers) and are changing rapidly. This involves training courses at the project site as well as short courses abroad. We organize a workshop every 3 years where all members of the team present the results of their work to a local and international audience. They are coached before the workshop on how to improve their presentation skills and how to integrate their presentation with the overall goals of the project. There are mutual benefits for both partners because we share experiences and assist in the use of multi-media presentations. The involvement of students (both Canadian and national) is also of mutual benefit, particularly when they are teamed up with each other, have joint responsibilities and conduct the fieldwork and data analysis together.

3.4 The most important findings: Collecting information is relatively easy, and with the computer based logging devices and participatory surveys massive data sets can be collected quickly. What is much more difficult is to assure data quality, integrate the data and convert information into knowledge that assists decision makers and managers. We feel we were fairly successful in documenting the status of the resources in our Nepalese watershed, and in identifying the key processes and issues that are indicative of degradation. The shortcomings are how to effectively ameliorate the situation.

The three most important findings can be grouped into:

- (i) Land use dynamics and soil fertility decline.
- (ii) Water quantity and quality problems are widespread and rapidly emerging.
- (iii) Rehabilitation of degraded lands is viable but challenging.

(i) *Land use dynamics and soil fertility decline.*

Both expansion of agricultural land into marginal grass and shrub lands and agricultural intensification (triple annual crop rotations) are taking place simultaneously, and nutrient inputs appear to be insufficient to sustain long term productivity. At the same time, nutrients contained in the forest biomass are continuously removed without any returns to the forests, and this is leading to long term forest soil fertility decline. There is clear evidence of soil acidification (inherently acidic bedrock, acid producing fertilizers, pine dominated litter from the forest), and this is leading to phosphorus deficiencies and is impairing decomposition processes. Organic matter and associated nitrogen, soil pH, exchangeable Ca, and available phosphorus are all key indicators of soil fertility degradation process. The forest soils have the worst fertility status followed by grassland, and rainfed agricultural land. Only irrigated fields have fertility conditions that are considered adequate. Based on calculated nutrient budgets on individual farms (Brown, 1997) it is apparent that average N and P inputs are in deficit over crop demand, and nutrient losses occur in both irrigated and rainfed agricultural systems. This degradation process is confirmed from farm interviews which indicate that productivity is stagnating even with higher inputs of chemical fertilizers. There are significant shortages of animal feed which impacts the quality and quantity of manure input into agriculture, and up to 45 % of the farmers reported that the land they farm is insufficient to meet their families basic needs.

(ii) *Water quantity and quality are rapidly emerging problems.*

The prevailing climatic conditions are characterized by a distinct monsoon season followed by a prolonged dry period. To maintain triple annual crop rotations, irrigation is an essential requirement. Agricultural production has expanded in an attempt to keep pace with population growth, and with the introduction of cash crop production (potatoes and tomatoes) the demand for irrigation water during the dry period has increased dramatically. This has not only lead to widespread water shortages but water pollution is emerging as a key issue affecting drinking water supplies (Schreier and Shah, 1996). Eutrophication and the indiscriminate use of pesticides on potatoes and tomatoes are early indicators of emerging problems.

The investigations into sediment dynamics revealed that soil nutrient losses by erosion and clogging of the irrigation systems are the main problems relating to water resources management. The dominant source of sediments is the degraded shrub lands and the majority (60-80%) of the annual soil erosion occurs during the pre-monsoon storms when there is little vegetation on agricultural fields and degraded sites. Some of these findings were confirmed by the participatory survey in which water shortages for irrigation and drinking water were rated as the most critical issues to be addressed (Shrestha and Brown, 1995).

(iii) *Rehabilitation of degraded lands is viable but challenging.*

Based on the above findings it was decided that a key approach to preventing further degradation was to set up a demonstration site for rehabilitation techniques on a very degraded shrubland site (1 ha). These degraded lands are the only areas in the watershed that are non-productive and at the same time they are the cause of most of the sediment problems in the streams. This also provided an opportunity to experiment with soil fertility amelioration, a subject that has so far received relatively little attention. The focus was placed on using nitrogen fixing, native fodder trees as a means to stabilize erosion, produce animal feed and firewood, and to ameliorate the soils by incorporating nitrogen and phosphorus fixing organisms and processes into the farming system. We identified some key species that are excellent colonizers of degraded lands, and were also able to establish a biodiversity garden that is producing a substantial amount of organic matter and fodder, some of which is made available to adjacent farmers, and the remainder is incorporated into the soil. Rehabilitating soil fertility, particularly building up the organic matter component, is a slow and challenging process. Hence the motto: conservation and degradation prevention is far easier than rehabilitation.

3.5 Research issues and processes: The issues of soil fertility decline and water resource degradation are highly complex, extremely variable and not readily apparent. Soil fertility decline is hidden in lower crop productivity which is highly sensitive to climatic variability and resource degradation is only visible during critical periods of the year (end of dry season). The greatest challenge to the researchers is to find good indicators, to quantify degradation processes and to come up with solutions that ameliorate the identified problems. There are no quick and easy solutions. New approaches have to be introduced into the farming system in a cautious manner, and with full cognizance of the indigenous systems and social setting. This is an area where more research efforts and collaboration between physical and social scientists are needed. Such research also requires a different approach. The farmers need to be an integral part of the research team. Trust between farmers and scientists must be established and benefits have to be apparent early in the intervention. It requires a complete linkage between science, social science, management and economics, and few of us are equipped with the right tools, approaches, attitudes and patience.

Some of the key issues that have emerged from the research are:

- Soil fertility decline is widespread and soil fertility rehabilitation needs to be given a high priority. There are no quick and easy ways to improve the conditions because the farming system is very complex and all parts of the system need to be considered (forestry, livestock, irrigation,

- fertilizers, organic matter management, decomposition, physical factors affection soil structure and hydrological properties, socio-economic settings etc.).
- Water resources management is emerging as the critical issue for both agriculture and people. Water shortages and water pollution during the dry season are becoming the key limiting factors for further expansion of agriculture and the deterioration of human health.
 - The farming system is highly dependent on livestock to supply essential organic matter and nutrients to sustain soil fertility. There is ample evidence to suggest that fodder supplies are far too scarce to maintain a sufficiently large and productive herd of animals. Producing a more reliable and nutritious feed supply is emerging as a major issue. The use of leguminous crops and nitrogen fixing fodder trees as part of the farming system is a key issue requiring further research.
 - The farming system is very labour intensive with a highly elaborate terrace system and irrigation network that consists of thousands of channels and check-dams. In addition, the dependence on livestock and firewood, and the absence of an adequate infrastructure (roads, market access, etc) makes this one of the most challenging and time demanding farming systems. Given the social and religious setting, women proportionally carry a far higher share of the workload than men. One of the key issues is that as the forests degrade the proportional effort to collect firewood, fodder and litter increases exponentially. Traditionally, the women are responsible for these tasks which are in addition to planting, weeding and harvesting. With agricultural intensification and degradation the workload for the women has increased significantly and ways have to be found to reduce their workload. The women spend an average of 3-4 hours a day per household collecting fodder and firewood, and with the deterioration of the forests this task becomes greater as travel distances are increasing and supplies are decreasing.
 - It is essential to focus the research on processes and rates of change. Only with such data can we create models and make projections. An essential research issue is to develop scenarios for the future. With GIS and computer models we can develop a range of scenarios that can be compared and sensitivity analyses can be used to assess which key variables contribute greatest to the outcome.
 - These issues have been identified using both bio-physical and socio-economic surveys. However, the more important research issue that is emerging relates entirely to how one can improve the stressed resource base. These are research issues that need to be addressed at the community level. Participatory research on how to introduce nitrogen fixing crops and fodder trees into the farming system is one of the main challenges. Improving irrigation efficiency is also an issue that can only be dealt with at the community level. Special attention must be directed towards user groups and in this context it is clearly evident that if we plan to improve the forests we have to incorporate our research with the women groups that use and manage the forests.

3.5 Lessons learnt and advice to others: Subsistence farming in mountain watersheds is challenging and the indigenous farming practices are in most cases well adapted to the environment. The farmers are innovative and very perceptive, but often do not have the means or the option to experiment. Under current population pressure it is clearly evident that the farming

system in the Jhikhu Khola watershed is under stress. There are a number of lessons that we want to share:

- (i) Involve the farmers in the research; it is of mutual benefit.
- (ii) Don't rely entirely on socio-economic or participatory surveys. Use quantitative measurements to calibrate indigenous knowledge and assess the magnitude of the stated problems independently.
- (iii) Work with a small interdisciplinary team of dedicated people and pay close attention to the team configuration. Incorporate women into the team at the start because without them you will obtain an very inadequate understanding of the farming system.
- (iv) Use a combination of traditional and new technologies in your research. This will assure better data reliability and allows you to calibrate measurements independently.
- (v) A long term commitment is needed to gain a good understanding of the dynamics of the system. Multiple surveys, repeated visits, and continuous monitoring are essential to verify and improve our understanding.
- (vi) Try many different experiments as some 50% may fail because of natural processes, human errors and technological failures.
- (vii) Make a long term commitment to training which includes constant upgrading and retooling.
- (viii) If you plan to use GIS be prepared for a very elaborate field effort to collect sufficient georeferenced data. Once you have the data the work has just begun. GIS is not user friendly, but data intensive, and time consuming. The payoff is long term. Be clear and selective on when and why you want to use GIS. It is an excellent integration tool but it is only cost effective if you plan on building and using the data over long time periods.
- (ix) To incorporate socio-economic information into the GIS system requires a new approach to participatory surveys. All information needs to be gathered in a georeferenced manner. The best approach is to use enlarged aerial photos during the field investigation and mark all observations in a spatially referenced manner so that the data can readily be incorporated into the GIS database.
- (x) Introduce computers into your project. It forces everybody to collect data in a more quantitative manner, it gives researchers more options for data evaluation, and it is a real incentive for young people to get involved.
- (xi) Using Hypertext and multi-media are highly effective communication tools and allows us as scientists to be far more creative in how to present information and knowledge. We as scientists have done a relatively poor job in communicating our results to politicians and decision makers. Combining GIS, computer graphics and text with images provides us with new opportunities to communicate better. This technology is becoming relatively simple and is very cost effective.

Research for development can be very frustrating, and patience and perseverance are key topics. Our project has evolved and progressed in spite of many failures. Setting up the monitoring stations in the wrong place, relying on the wrong people to collect data, introducing inappropriate technology and methods, conducting too many structured socio-economic surveys in the same place are all examples of failures. We have learned from these experiences. Probably the greatest lesson we have learned is to pay more attention to people. Involve the farmers in the research from

the beginning, conduct rapid and diagnostic surveys and listen to the farmers complaints and demands. Then define and focus your research. Community based research is now the buzz word throughout the world. There is much to be gained from such an involvement, but at the same time we need to be realistic. Community based research without independent calibration and critical evaluation can be highly misleading. It is suggested that a hybrid and integrated approach is likely to be most effective.

4. Conclusions

Our project started before community based research was popular. As a result the methods we used evolved from a heavy focus on biophysical surveys to a mixture of computer based monitoring, diagnostic surveys and rapid socio-economic surveys. Based on our research it is clearly evident that soil fertility is declining, water resources are under stress (shortages and pollution) and both livestock and forestry which play an integral part in maintaining the farming system are under great pressure. There are widespread feed shortages and the forest soil fertility is declining because of the heavy removal of timber, firewood, fodder and litter. In the long run this leads to reduced biodiversity, a decline in forest soil fertility and reduced productivity.

Good indicators of degradation have been identified but a far more challenging research problem is how to rehabilitate degraded sites and reverse the degradation processes. We focussed on the use of nitrogen fixing fodder trees, improving irrigation systems, and rehabilitating degraded sites to ameliorate soil fertility. A community participatory approach is critical if we hope to make an impact and gender based research is proving to be essential.

Incorporating computer techniques into the research program proved to be very effective. Not only did it assist us in integrating the complex resource data but it provided us with the opportunity to experiment with new multi-media tools that we hope will lead to better communication between the scientists, the community and the decision makers.

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PRACTICES AND REALIZATIONS ON COMMUNITY-BASED NATURAL RESOURCE MANAGEMENT IN THE MOUNTAINOUS AREA OF GUIZHOU PROVINCE, CHINA

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Abstract

The CBNRM project started in February 1995 and will end in January 1998. Through the implementation of interventions such as setting up a community-based natural resource management system of village regulations and folk agreements and the like, in comparison with those in 1994, there has been some progress in the management and use of the various natural resources. The ecological environment has shown a tendency to improve. Agricultural and animal production has increased greatly, the food supply for villagers is sufficient and their food patterns are turning to higher energy levels. The settled environment, the living conditions, hygiene and health care of the villages have obviously been improved and the managing function of community organization has been further strengthened.

1. Background and Institutions

1.1 Background

Guizhou Province is situated in the eastern part of the Yunnan-Guizhou plateau in Southwest China, with mountains and hills accounting for about 90% of the land, and minority people taking up 40% of the population. The province is the most typical mountainous agricultural province and one of the provinces in China where many minority nationalities live.

Guizhou is one of the poorest provinces in China. The major socioeconomic indicators such as per capita income, grain production, area of arable land are all among the lowest in China. Of the 34 million people in the province, 30% are living under the poverty line accounting for over 10% of the poor people in China. Most of the poor live in the south and southwest of the province where most of the minority nationalities live. In those areas the income per capita is less than 400 yuan (CNY) and the grain yield per capita is only 200kg.

Due to the family planning policies in China, which are more relaxed for the minority nationalities, the population grows much faster in the mountainous area of Guizhou and the conflicts between population and resources becomes increasingly acute. In the past, the governments have stressed grain production on arable land for food supply and social stability, while the systematic development, management and protection of agricultural natural resources has been ignored. This has resulted in serious environmental problems such as destroying forest for land reclamation on a large scale; soil erosion and water loss; and shortage of water. The ecological environment is increasingly deteriorating. Therefore, the environment is falling into a vicious cycle as "population growth-environment deteriorated-lack of grain".

In the poor and minority inhabited mountainous area of Guizhou province, the human diet is very simple without enough calories, fat and animal protein available. The governments have undertaken many projects to promote the social and economic development in minority areas. But

these projects stressed mainly economic development, especially self-sufficiency of grain, while the improvement of food, nutritional needs, hygiene and health as well as social and cultural environment were ignored.

1.2 Participating Institutes

Lead Institute: Guizhou Academy of Agriculture Sciences (GAAS)

Participating Institutes:

Guizhou Provincial Nationality Institute (GPNI)

Guizhou Nationality College (GNC) (undertaking research on Effects of Social and Cultural Factors on Community-based Natural Resource System in Target Villages)

GAAS' Staff Hospital (undertaking research on Nutrition, Hygiene and Health of the Target Villagers)

Guizhou Provincial Rural Policy Institute (providing the consultations and suggestions relevant to Community-based Natural Resource Management Policies)

The People's Government of Changshun County (participating in research on Relationships Between National Policy System and Community-Based Natural Resource Management and formulation and implementation of the intervention measures).

The other project tasks were carried out by the Scientific Information Institute; the Soil and Fertilizer Institute; the Upland Crop Institute and the Integrated Development Institute of GAAS.

2. Objectives

2.1 General objectives

To study and improve the existing utilization of the natural resource system, household food consumption patterns and community health situation in order to improve household and community resource management systems to enable local communities to achieve food security and enhanced family welfare and income.

2.2 Specific Objectives

- (i) To describe the present economic and agro-ecological situation of the natural resource system in two villages.
- (ii) To describe the effect of social and cultural factors affecting the natural resource system in the communities.
- (iii) To study and evaluate previous interventions and the current policy and infrastructure (at the village, township, county, provincial and national levels) relating to development of the natural resource system in the villages.
- (iv) To describe and evaluate the current nutritional and health status and their interaction with the current utilization of the natural resource system in each village.
- (v) To study current household and community resource management systems.

- (vi) To identify opportunities for comprehensive intervention packages that will assist in sustainable management of the natural resource system in order to:
 - improve income at the household level;
 - increase food security at the household and township level; and
 - improve the general nutritional status and welfare of the participating communities.
- (vii) To design and implement research (on-farm, on-station and in- home) and pilot intervention packages with the active participation of members of the community and local government. These interventions will complement existing government programs.
- (viii) To evaluate and report on the effectiveness of the interventions in the study area, and revise as necessary for wider dissemination in similar areas of China.

3. Research Process

The project includes three research phases:

- February 1995 - July 1995: Adopting the RRA, PRA approaches to conduct the investigation, research and appraisal on social and economic situation in target villages and to work out the intervention measures.
- August 1995 - October 1997: Based on the intervention design, to practice the intervention measures.
- November 1997 - February 1998: Summarising and evaluating the project. To submit the final report to IDRC and to provide suggestions on natural resource management to the governments in areas similar to Guizhou province.

3.1 Investigation and appraisal phase

The minority inhabited mountainous regions in Guizhou province are less developed, which results in a simple population structure. For instance, there are five group types in the target village of Dabuyang:

- common villagers engaging in farming
- households based on agriculture while running small businesses
- highly respected and experienced village elders
- group cadres elected by villagers
- rural school teachers, and
- village health and veterinary workers.

Among them, the village cadres mainly bear the duty to undertake community-based natural resource management. Based on income, the households are classified as, (a) rich households which have overcome poverty and improved livelihood with an annual net income per capita above 600 yuan (13 households - making up 23.6% of total households); (b) households with annual net income per capita between 400 yuan and 600 yuan (33 households) being just able to solve problems for food and clothing, making up 67.3% of total households; and (c) poor households with annual net income per capita below 400 yuan (5 households), having problems with adequate provision of food and clothing, making up 9.1% of total households.

In the first phase, RRA and PRA approaches were all used to conduct investigations to find out existing problems. Village cadres and villagers identified the obvious problems which are closely related to current production such as water resource development, forest management, ownership and the like. The research team also identified other problems related to further development and utilization relevant to ecology and the society, enhancing the output of arable land, destruction of forests for reclamation, and fires on mountains and the like. The research team and key villagers also raised some problems relating to management as well.

The different groups (including males and females) have different attitudes to natural resource management. For instance, the females pay more attention to the development and utilization of arable land resources, while the males are more interested in forest resources because the males are supposed to build houses for the next generation. These differences were discovered in two ways: (a) Frequent and in-depth interviews with farmers. The researchers spent about 200 days at experimental sites annually, during which they contacted and exchanged ideas with village cadres and villagers almost every day. They, therefore, are well acquainted with the ideas and requirements of different groups; (b) Observing the reactions from different groups in the intervention phase. For example, women play an active role in the agricultural technology training course, and most trainees are females, while the male villagers seldom participate in such trainings even though they were idle at home. The female villagers abided by the management regulations better than the male, and even dared to criticize and expose the persons who violated the regulations. Therefore, the female villagers are required to take part in management when various management groups were organized.

Through the investigation research in first stage, the following five reports were completed:

- (i) Investigations and Appraisals on the Current Situations of Natural Resources and Rural Economics in Target Villages.
- (ii) Effects of Social and Cultural Factors on Community-based Natural Resource System in Target Villages.
- (iii) Relationships Between National Policy System and Community-based Resource Management.
- (iv) Evaluation on the Current Situation of Hygiene and Health Care in Target Villages.
- (v) The Current Situation and Evaluation on the Household and Community Natural Resource Management System in Target Villages.

3.2 Implementing interventions and preliminary results

From July 1995 to March 1997, through the implementation of interventions on sociology, economics, rural infrastructure, hygiene and health care, there has been some progress in the management and use of the various natural resources. The ecological environment showed a tendency to improve. Agricultural and animal production has increased greatly, the food supply for villagers is sufficient, and their food patterns are turning to higher energy levels. The settled environment, the living conditions, hygiene and health care of the villager have been obviously improved and the managing function of community organization has been further strengthened.

Now the two target villages also have stable and sufficient food and clothing, and a relatively comfortable life. These are reflected as follows:

- (i) Part of the forest land, originally managed by the community, but ill-managed, was assigned to households to use and manage. The utilization, management and production rights encourage long-term stability and can be inherited, thus a forest land management system managed by two levels of community and household was established, and this stimulated the farmers' enthusiasm for planting trees, protecting forest resources and developing forest production. In two years, 45 thousands trees were planted (on average each household planted 1000 trees), and more than 2 ha. arable land was removed to plant fruit trees. Due to the managing function of the community and the villagers' strengthened awareness of protecting resources, fires on the mountains and reclaiming land by destroying forests have disappeared.
- (ii) By extending high - yield, high - quality developed varieties and scientific cultivation technology, the yield per unit arable land has been enhanced greatly. There are 35.8 ha. paddy fields in two target villages. The average yield per unit area has increased from 4514 kg/ha. in 1994 to 6465 kg/ha. in 1996, and the rape oil yield per unit area has increased from 394 kg/ha. in 1994 to 829 kg/ha. In 1996.
- (iii) There are 2 ha. of high-yielding demonstration peach gardens and 1.02 ha. of Chinese chestnut gardens built up on waste land. Research was conducted to develop and use the large area of idle waste land, so as to increase the villagers' income.
- (iv) Following the input proportion of 40% funded by the project, 60% contributed by villagers' raised funds and labour input, an irrigation station, two tap water projects, one cement road, one 20kw transformer, more than 800 meters irrigation ditch, one inverted siphon tube and one 80-meter aqueduct were built, in order of priority by the villagers, in the target villages. These newly set-up basic facilities (a) converted over 10 ha. rainfed paddy field into high-yield irrigated ones; (b) provided irrigation to 3.2 ha. fruit orchard; (c) supplied the target villages with tap water for the first time in the whole township and has thoroughly changed the extremely difficult situation of potable water in Xiaozhai village for long, and has greatly reduced women's labour. These have created improved health and hygiene for the villagers. Recently, a few villagers in the target area are beginning to rebuild the toilets, cooking stoves, shower rooms and have also purchased washing machines.
- (v) In order to develop and utilize the abundant grass land and shrub land resources in target villages, the villagers were encouraged to raise cattle and goats. By the end of 1996, there were 2.4 heads of cattle per household, an increase of 0.2 heads in comparison with that in 1994 in Dabuyang village. In 1996, 32 heads of black goat were introduced into the target villages and raised by 4 households. Now, these have increased to 92 heads and help each household to generate an income of 1,500 yuan on average. There are good prospects for large-scale raising of animals in the near future.

- (vi) In order to change the backward ideas and customs, about 100 cadres and villagers were organized three times to visit the advanced place where the rural economy developed rapidly in our province, as well as to support the township government to establish a TV satellite receiver station to help the villagers learn more and clearer modern cultural and scientific information from inside and outside of our province and at home and abroad. The two interventions have achieved the anticipated results and removed the ideological obstacles for carrying out various intervention measures smoothly.
- (vii) Holding a general meeting of villagers to elect the leaders of the community organizations in a democratic way, to increase the organizing capacity and prestige of community organizations, and to enhance the reliability and effectiveness on community-based resource management. In two years, the villagers' communities were reformed through the democratic election, and the following basic community organizations were established: village forest management committee; development fund management committee; water and irrigation station management group; cattle management group and the like.

In the intervention phase, the following were carried out:

- The significance and effects of village regulations and folk agreements on current natural resource management in minority inhabited area (to be finished in Oct., 1997);
- Study on mechanism of input benefit for external funds in Community-based Natural Resource Management in the Mountainous Area of Guizhou Province (finished);
- Gender analysis in community-based natural resource management (to be finished in Oct. of 1997);
- The characteristics and practice of community-based natural resource management in the minority inhabited mountainous area of Guizhou province (to be finished in Oct. of 1997).
- Experiment on forbidding forest destroying for reclamation by planting fruit trees on newly claiming land (finished).
- Upland intercropping and multiple cropping system taking oil rape and maize as the dominant crops (finished).
- Experiment on black goat introduction (finished).
- Research on development and utilization of crop residues (finished).
- Varieties comparison experiment of high-yield and high-quality hybrid rice, hybrid maize and hybrid oil rape (finished).
- Tracking investigation on food patterns and nutrition of target villagers (finished).

3.3 Impact on policy in intervention phase

Some management regulations and intervention measures have been worked out during the intervention phase. Those measures are going to be recommended to the government for adoption to complement the relevant policies after the project is finished. At present, some intervention measures have made an impact on local government policy. Taking tobacco production as an example, before the project, the villagers in target Xiaozhai village were required to plant tobacco

by the local government. The technical training, relevant policies and services could not form a complete system to meet the needs, resulting in low yield and poor benefits, such that the villagers had a lot of complaints. After the investigation, we suggested the township government adopt a policy such as "Combining technology services with material support, lending the production materials to farmers as loan, contracting with farmers for yield reparations and purchasing tobacco production nearby" to support tobacco growing. The initiative of villagers was enhanced in 1996, when the planting area was increased and better benefits were made. The tobacco planting area was further enlarged and the tobacco planting area per household reached over 0.4 ha. in 1997. In the past, all infrastructure construction among various projects run by government were invested by government without any pay back and contracted to the construction team to build. After the construction, the facilities were handed over to villagers without relevant management regulations. This has formed the villagers' dependence on the government and did not ensure the quality of project. The villagers did not take good care of the facilities during their utilization. The facilities were damaged rapidly and caused a lot of waste. In light of this situation, in the implementation of the project, the following improvements were adopted:

- (i) The project fund does not exceed 40% of the total input, and the local contributions (including local raised fund, material input and labour input) take up at least 60% of total input.
- (ii) The project is not allowed to be contracted to construction teams from the outside to build. Rather it was finished by organized community villagers themselves.
- (iii) Once a project is built up, a management regulation will be worked out and a person in charge will be selected to manage with payment.
- (iv) Paying for using the facilities. The input from the project will be deducted as a percentage from the reclaimed effect money and returned year by year after the project established.

These approaches overcame the villagers' dependence on government, improved the quality of project, ensured the better utilization of established facilities and lengthened their utilization period. The leaders from county government and township government were highly appreciative of these improvements and recommended applications of these by state in future.

4. Training

4.1 Training on Rural Social Science Methodology

In collaboration with Yunnan Academy of Social Sciences and Yunnan Institute of Geography, Guizhou Academy of Agriculture Sciences undertook a training course on Rural Social Science Methodology, and the following were completed:

Training topics: (a) Rapid Rural Appraisal; (b) Participatory Rural Appraisal; (c) Sampling Technology and Questionnaire; (d) Field Study; (e) Gender Analysis in Resource Management; (f) Social Impact Assessment; (g) Monitoring and Evaluation.

Participating trainees included all the project research members (18 persons), township government officer (1 person), village leaders (4 persons) and the leader of clan (1 person).

Through training, the project research members who have been engaged in natural sciences for a long time systematically learned the social science methods in the research of rural development, basically changed their thinking mode of "Top-down" to "Bottom-up". The training enabled the researchers to carry out the project work smoothly (especially the investigation and evaluation research in first stage) and made great progress on it.

4.2 Agricultural Technique Training

Based on the intervention measures, various agricultural technique trainings have been run 18 times in different farming seasons and key technique periods. The method of combining classroom teaching with worksite practice was used in the training. There were a total 599 villagers and 26 local officers trained. The trainees included 479 target villagers (60% females) and 120 villagers from other villages of the township. We took the approaches of "first training and then practice" and "training while practising", the key intervention measures of the project having reached the anticipated requirement and effect.

Specific training courses included:

- (i) High-yield fruit tree planting technology (five times, 90 persons)
- (ii) Raising rape oil seedlings for transplanting technique (four times, 110 persons)
- (iii) Raising rice seedling on uplands and shallow transplanting technique (four times, 180 persons)
- (iv) Training on upland belt rotation multiple cropping system (four times, 60 persons)
- (v) Edible mushroom cultivation technique (four times, 160 persons)
- (vi) Black goat raising technique (three times, 25 persons)

4.3 Maternity and Child Hygiene and Health Training

The training was held three times for 79 villagers (90% women). The contents included:

- (i) Rural barefoot doctor training. Two young villagers (one male, one female) were selected and sent to accept one-year systematic medicine training in GAAS's Staff Hospital and Huaqi Hospital of Guiyang city.
- (ii) Maternity and child hygiene knowledge training (two times, 70 persons)
- (iii) Workers training on tracking investigation of target villagers' food nutrition (one time, 7 persons)

4.4 Study Tour

In order to change and renew the ideas of researchers, community management personnel and target villagers, and to study and exchange the experience on natural resource management, a total of 107 persons were organized to visit and study in the advanced places in and out of the province at four different times:

- (i) In July, 1995, 10 persons (including 3 researchers, 1 township government officer, 3 target village leaders, 1 leader of clan, 2 representatives of women) were organized to visit Zhunyi, Dejiang, Jinpin counties where forestry and animal husbandry production were developing fast.
- (ii) In March, 1996, 44 persons (including 2 researchers, 42 cadres and villagers of the target villagers. 27 female villagers among them) visited Zhunyi county to study the experience on high-yield oil rape cultivation.
- (iii) In December, 1996, 48 persons (6 researchers, 3 township government officers and 39 target villagers) were organized to visit Dague village, Luodian county, Guizhou province and to study their experience on soil improvement and water control.
- (iv) In September, 1996, 5 project researchers visited Huaxi village, Wuxi city, Jiangsu province to learn about community management.

5. Research Findings

Some preliminary results have been achieved, and the three main research findings are as follows:

5.1 Preliminarily setting up and formulating a set of village regulations and folk agreements in natural resource management. With the following characteristics, these regulations play an important role in natural resource management of target villages at present and in future:

- (i) The regulations were formulated by village cadres and villagers through repeated discussions. Due to their detailed managing particulars and perfectly clear rewards and punishments, they possess great authority and are easy to practice. The role of the project team is to organize village cadres and villagers to research and discuss, fully listen to the opinions and requirements from different groups, and at last to systematize and standardize the management measures put forward by villagers. The researchers document the measures, and then present the documents at general villagers meetings for discussion and approval, after which all are printed and distributed to all the villagers.
- (ii) In light of the following realistic situations:
 - (a) The Chinese legal system is still under construction and needs to be perfected. The laws and regulations related to natural resource are still imperfect;
 - (b) The law enforcement agencies are imperfect; law enforcement needs to be strengthened;
 - (c) Some slight violations on natural resource often happen in community, while the state relevant laws and regulations cannot reach those violations. So, the village regulations and folk agreements formulated by villages have special significant and important effects in community-based natural resource management at present. For instance, "Dabuyang village forest management regulation" stipulates that any villager who steals and cuts down a tree belonging to the village cooperative or other villager's contracted forest land, and with the tree diameter of less than 4cm,

will pay a fine of 10 yuan for each tree...". The state laws and regulations cannot stipulate such detail to deal with such damaging behaviours.

- (iii) The management regulations stipulate that one should pay for use of short resources, limited resources and resources needed to make investment in developing and utilizing. It is also required to refund the external input yearly by paying for the utilization for infrastructure construction. Such a stipulation effectively changes the ideas and behaviours of "resources belonging to public and being not a penny worth, everybody can use free and waste them", which exist among villagers historically.

5.2 The intervention measure of planting fruit trees on newly claimed land was implemented to stop the activities of destroying forest for reclamation, which also exists widely among target villagers. It has effectively halted the activities of nibbling the forest land resource and destroying the forest by planting fruit trees between the forest land at upper part and the arable land at the foot. As a kind of isolation, it helped to realize the organic combination of economic effect and ecological effect.

80% of the total households in Dabuyang village had reclaimed land for crops by destroying forest on the cooperative forest land since 1979 when the household contract responsibility system with remuneration linked to output was conducted. Furthermore, the area of destroying forest is enlarged yearly, which greatly threatens the protection of forest land in this village. In the first phase of the project, the villagers were required to return the reclaimed land to afforestation, but this was difficult for them to accept. Later, we changed returning the claimed land into planting fruit trees. There were 1,500 high-quality peach trees planted by villagers on 2 ha. claimed land. Since building up fruit orchards to protect forest, villagers no longer encroach on the forest land up to now.

5.3 The agronomic technological interventions relying on introducing and extending developed hybrid rice, hybrid maize and hybrid oil rape varieties have greatly enhanced output of current arable land and realized the project objective of ensuring food security of target villagers and adjusting food patterns to higher level. In 1996, rice yield per unit area increased by 43.2%, oil rape yield by 110% in comparison with 1994. The increase of oil rape yield provides the plant oil to readjust the villagers' food patterns, the plant oil consumption per capita increased from 4.1kg in 1994 to 6.3kg in 1996.

6. Organization and Coordination of the Project Team

6.1 In the project, the assistant units undertaking specific research work include Guizhou Provincial Nationality Institute (GPNI), Guizhou Nationality College and GAAS Staff Hospital. Due to the different disciplines, different specialties and the different research approaches as well as the different values and working style, the project leader had difficulty organizing and coordinating the research work of the whole project. We used consultations as the basis of equality, solidarity and cooperation to solve the problems. For instance, the research members from GAAS often work in the rural areas and are used to hard life, so they all submit to the arrangement of project leader and work in target villages for a long-term, according to the need of the research. But the

researchers from Guizhou Provincial Nationality Institute and Guizhou Nationality Collage can only go to target area to conduct research for a short time. Originally, many interventions related to sociology in the intervention stage of the project should be implemented by them. Since they bear responsibility for many other projects, they cannot stay in our project sites for a long time and are unable to carry out the interventions. In order to fulfill the whole research, the researchers from GAAS had to undertake all the intervention measures. Once encountering the critical problem, we still invite the researchers from GPNL to discuss together and fully accept their opinions.

6.2 Building up and keeping good cooperation with local government. The government of Changshun county, one of the participating units, appointed one vice county magistrate to take part in the project annual planning and summarising, to come irregularly to the sites to participate in some research and discussion, and to coordinate the relationship between project team and the basic government departments of township and village. One vice leader of the township government participates in the research all year around and is in charge of coordination between the project team and township government. The two leaders of township government can take part in the discussions on important matters in time and always extend some intervention measures to the whole township. The good cooperation among the project leader, research members and local government is the important factor to ensure the project research work ran smoothly and achieved good results in two years.

6.3 During the project period, a series of regulations for natural resource management were formulated and a lot of technique measures for developing and using were adopted. Considering these regulations and measures still need a longer time to be tested, complemented and completed, we have not yet recommended any of them to the government as the policy outcomes to extend in large scale. Some management measures will be revised and complemented after the first phase of the project, and then written down in the suggestion report to provide the reference to government policy makers. Some measures should be tested for a longer time and on a larger scale. They can then be recommended to the government formally to adopt as a relevant policy for wider dissemination. Furthermore, some successful technique interventions have already been extended in the whole township by township government on its own initiative.

7. Lessons and Suggestions

7.1 Community-based natural resource management involves both natural sciences and social sciences. According to the project content, natural sciences include the disciplines of agriculture, forest, husbandry, water, food nutrition, hygiene, health and the like, so, the project is a integrated project combining software and hardware. It is the first time our researchers have undertaken such a project, and we have to devote most of our time and energy and live in target area for a long time to do arduous and painstaking work in order to fulfill the research task. Therefore, the research teams require representation of the essential disciplines and their members must have a wide range of knowledge, as well as a sense of responsibility and determination of character to work hard and endure hardships. Otherwise, it is difficult to bear the tasks for the two years' implementation of the project, the main researchers (including senior researchers and project leaders) having spent more than 200 days a year working in the target area. They implement the technical measures in the daytime while carrying out the sociological management research in the

villagers' houses in the evening. Of course, not everything turns out as expected in our research work. In addition, if we had an opportunity to continue such a project in future, in terms of researchers needed by the project from other disciplines outside the coordinating institute, we would like invite some well-known experts from NGO to participate in the project; this would make it easier to coordinate the research work and to guarantee the research quality.

7.2 There is a little time left for the project, which started in February 1995 and will end in January 1998. We are aware that a lot of planned interventions have not yet been fully implemented and some on-going interventions haven't produced perfect or reliable results as well. In particular, the sociological interventions, which aim at enhancing the quality of population, have hardly achieved the anticipated results in such a short time. So, we suggest that three-year period for the project should be changed to a five-year period. It is more favourable to acquire the systematic, thoroughgoing, reliable and complete research results.

7.3 It is essential to put a certain amount of funds as the initiative in basic facilities' construction and new technological measures' extension in target areas in order to carry out the research of community-based natural resource management in poor minority mountainous area of Guizhou province.

To avoid target villagers' dependence on these inputs and to guarantee the project quality, we abided by the following two principles when determining the input:

- (i) In general, the project fund does not exceed 40% of the total input; the local contributions (including local raised fund, material input and labour input) take up at least 60% of total input. The project mainly relies the input of villagers of community. If the requirements cannot not be met, we would rather give up the input.
- (ii) The input from the project will be deducted a percentage from the reclaimed effect money and returned year by year after the project is established. Setting up development funds for villager groups, the development fund, which takes the returned fund as the dominant one, is to be used in the construction of productive and public welfare project in target areas in a rolling way, and to enable the target villages to form a system of self-development and self-accumulation, so as to strengthen the economic capacity and management ability of the community.

It has been proven from the two-year practice that such a fund input not only guarantees the quality for infrastructure construction, but also educates the villagers on the respect of "resource is negotiable and should paid for the use of" and to help them change the idea of "resource belongs to public, every one can use it free".

7.4 It is essential to have enough financial support from outside for carrying out the project of community-based natural resource management in the poor minority mountainous area of Guizhou province, because China is still the largest developing country in the world. The most pressing task faced by the governments at all levels is to make great efforts in developing the economy, to ensure 1.2 billion people have enough food and clothing, and improve the living standard to some

extent yearly for quite a long period in future. The task of developing the economy in Guizhou province is much heavier and more pressing than other areas in China, since it is one of the poorest province in the state. Therefore, it is difficult for local government to input more special funds to support the research on natural resource management. This kind of research, however, is the most important for China, especially for Guizhou to develop sustainable agriculture in future. Poor regions in developing countries must try to gain the assistance (including financial support and high-level researchers' training) from developed countries or various international organizations to guarantee they can launch the studies on natural resource management.

NAM NGUM WATERSHED MANAGEMENT STUDY

LAO PDR, PHASE II

By: Phanthong Masixonxay

Abstract

The paper presented is the outcome of a five-year action research project undertaken in Nam Ngum Watershed. It is a cooperative activity of the CPAWM, Department of Forestry, Lao PDR and the University of Sydney with financial support from the Canadian International Development Research Centre (IDRC). The paper elaborates the background of the project, key local problems, specific research objectives dealing with local resource use and management, process in conducting research, training, preliminary research findings, problems and challenges, lessons learned and several recommendation on additional research activities needed to be carried out in Nam Ngum Watershed and elsewhere in Lao PDR. Some of the important conclusions from the study project are as follows:

1. Background

Nam Ngum Watershed is situated in the centre of Lao PDR and spreads upward to the North, between longitude 18° 36'8" to 19° 7'68" and latitude 102° 39'5" to 103° 4'60". The project was implemented in 2 phases.

Phase I of the project was mainly a survey including socio-economic data collection in 167 Villages and concentrated in two villages around the reservoir (Namon and Huayyang Village). The project team included officers from Department of Forestry, Vientiane Forestry College, and the Teacher Training College. These organisations would have one or two representatives in organising the project team.

Key local problems which led to the project were:

- Problems in the management and use of natural resources in each and every region was different, meaning a "blueprint approach" was unsuitable.
- Unclear tenure rights and management responsibilities encouraged unsustainable resource use.

Problems in the district level:

- Unclear rights and responsibilities made decision making difficult, with insufficient district staff to motivate people.
- Improper co-operation between the village authorities and other level of authorities made it difficult to find solutions to problems.

To further study the area and find solutions, during Phase II, the project was concentrated in four specific project sites:

- (i) Longkone village, Phoukood district, Xiengkhuang province.

- (ii) Ta and Nongpet village, Peak district, Xiengkhuang province.
- (iii) Muangsoum, Namphao village, Vangvieng district, Vientiane province.
- (iv) Namone, Huayyang, Donesua, Donesamphan village, Longxan district, Xaysomboon special zone.

2. Specific Research Objectives

- (i) To investigate means to build capacity at village and district levels in resource demarcation and planning, and incorporating indigenous knowledge.
- (ii) To identify potential and constraints regarding livelihood adaptation, in the context of resource pressures within the watershed.
- (iii) To develop capacity at the community level for making development project requests in the area of livelihood enhancement.
- (iv) To develop participatory impact assessment procedures for resource use project that impact or encroach on local livelihoods.
- (v) To study means of enhancing linkages between national policy and local implementation in the area of community resource management.
- (vi) To build a network within the watershed and more widely among villagers responsible authorities and researchers concerned with community resource management.
- (vii) To continue to build the research capacity of Lao government staff and tertiary student in the area of local resource management.

3. Processes in Conducting Research

- Problems were identified by both the research team and community groups.
- The project involved local government farmers and women.
- The different interests and priorities of the groups were varied.

Data from Phase I indicated that although both men and women participated in resource management, men would determine most of the activities involved. The gender elements provided a source of information to the project.

4. Training

Training of local staff was one of the key activities implemented. The methods used were biophysical, inventory method and community development method.

The training was in two steps. The first step involved the research team, and training of trainers. These trainers would then train local officials and villagers (approximately 85 people were trained). The training was used effectively, especially as these trained people would contribute towards the project in the field such as monitoring activity in the localities and informing us on the progress of work.

5. Preliminary Research Findings

The most important findings are:

- (i) Resource management and demarcation: it is essential that ethnic differences over land-use are identified early and resolved if they are not to cause difficulties later in the project.
- (ii) Livelihood development: the revolving fund was successful in creating livelihood development activities in the project sites.
- (iii) District capacity building: seems promising, but district staff noted that ongoing funding support was needed to maintain morale and continue on with works.

6. Problems and Most Difficult Challenges

- The lack of capacity amongst staff members meant that work tended to be done in large groups, tying up staff and vehicles. This meant a slower rate of progress than might be expected.
- There was pressure from local staff and local people to turn the project from a research-focussed project to a development project. This is a natural problem, and partially overcome with the revolving funds etc.
- There was a complicated administrative system of approvals, etc. which was not attended to regularly due to field work etc and led to many delays
- Co-ordinating the output of information, in Lao, Thai and English proved difficult, and consistency was not achieved.
- The external advisor was not present as much as anticipated, and the ground often had to be revisited when he arrived to fill him in on the situation. Logistical difficulties meant that much of his work was done independently of the rest of the team in Australia.

The team was involved in the field of training of local government officers and it was useful to make our team work stronger.

Our project was feeding some data for forestry policies, decrees in local and national level mostly by discussions, conferences, report etc.

We also co-ordinated the research with other organisations like Dong Dok Forestry College, Organisations working in Nam Ngum watershed (GTZ, JICA etc) and other NGO's project (CUSO, CAA, JVC, CIDSE etc).

The project has provided some small scale revolving fund for the villagers in three specific sites for communities development research work:

- (i) Funding for buffaloes purchased to plough the agricultural land in Ban Longkone village, Phoukood District, Xiengkouang Province.
- (ii) Funding for weir dam construction in Ban Namphao, Vangvieng District, Vientiane province.

- (iii) Funding for cash crop cultivation and poultry keeping in Ban Namone, Huayyang and Donesua, Longxan District, Saysomboon special zone.

7. Lessons Learned and Advice to Other CBNRM Researchers

Lessons learned are those described previously under “difficulties”. These problems need to be overcome in future project activities. The project tended to be isolated from the rest of the Center for Protected Areas and Watershed Management (CPAWM), meaning that capacity obtained within the project was not passed on to other CPAWM staff.

Phase II successes were the continuation of work from Phase I, with further built-up knowledge amongst staff (which has been taken and used elsewhere in some instances). However, the level of new knowledge gained was low, compared with phase I.

More research needs to be done on:

- Quantifying the difficulties faced by local people as a result of reducing the level of swidden agriculture.
- Developing the methodologies of community participation, and recording this information.
- Developing a policy feedback mechanism for ensuring results and recommendations are put into Lao government policy.
- Translating the results learnt from the Nam Ngum studies to other catchments throughout Lao, and quantifying their relevance.
- Developing the capacity of Dong Dok University to provide quality student teaching, research and staff training.
- Developing sustainability criteria that maintains watershed values under heavy resource use.
- Correlating information, and co-operating with researchers from neighbouring countries examining similar issues with similar ethnic groups.

Impediments to this research were:

- The low level of staff training, reducing capacity for research and independent thought.
- The difficulties in recruiting quality staff, given the low levels of government salaries in an increasing market economy.
- Attracting government support for research is difficult, given other government priorities of national economic and social development.

COMMUNITY-BASED NATURAL RESOURCE MANAGEMENT
FOR THE UPLAND OF XUANLOC COMMUNE,
PHULOC DISTRICT, THUA THIEN HUE PROVINCE, VIETNAM.

By: Prof Vo Hung and Le Van An

Abstract

Xuan loc belongs to Phu Loc district, Thua Thien-Hue province, central Vietnam; it is a representative mountainous commune where the natural forest is decreasing, soil fertility is diminishing, and the ecological balance is being threatened. This is a micro watershed for CBNRM research and development. Research is really needed on natural resources management to help both researchers and villagers to manage and use natural resources for sustainable development. The project research activities were focussed on 4 main areas: improving wetland rice production, increasing livestock production, developing home-garden and forestry plantation. The results were collected successfully by an interdisciplinary team over 3 years (1994-1997).

1. Background to project

Vietnam is situated along the south-east margin of the Indo-Chinese peninsula. It has total land area of about 330,541 km² and extends for a length of 1,600 km between 23° north to 8° in the south. Vietnam has a tropical monsoon climate. About two thirds of country land is hilly or mountainous. Originally, almost all of the high land was covered by forest. The country is rich in natural resources of forest, land and water for livelihoods. It is rapidly changing in term of natural resources due to the economic development of country.

Central Vietnam consists of 13 provinces with about 17 million people. It covers on about 97,000 km². It is a long and narrow strip bordered by the Truong son mountain range in the west and the coast line in the east. Lands are dominantly upland to hilly with a very limited flood plain along the shore line. Central Vietnam is noted for its very hostile weather and climate: flood, drought, hot winds and prolonged rains are frequent natural events. The natural condition of weather and climate cause problems of soil erosion in raining season, water deficiency in dry season.

Xuan loc is the research site of the project. This is a micro watershed for CBNRM research and development. Xuan loc is the starting point of some small rivers flowing into two main rivers of Huong (Perfume River) and Truoi. This is also a representative of uplands in central Vietnam where the natural forest is decreasing, soil fertility is diminishing, and ecological balance is being threatened. Downstream of this area is the coast plain and lagoon where a high number of people are living. Xuanloc is a newly-established commune - since 1976. This commune was established by the new economic zone project of government. There are two ethnic groups: the Kinh people and the minority of Vankieu. The minority people practise shifting cultivation while the Kinh live on the natural resources of the forests and wetland rice. Forests are decreasing quickly due to the deforestation of many factors: the local people practise their farming, the government company

being active in this area. Research is really needed on natural resources management to help both researchers and villagers to manage and use natural resources for sustainable development.

2. Project objectives

2.1 The overall goal of research project is to build capacity and develop practical and participatory approaches for establishing sustainable resources management options and plans by villagers living in fragile upland areas.

2.2 The specific objectives are:

- (i) To understand and document agro-ecological and social-economic conditions, and formal and informal community structures and rules governing land and other resources use and management patterns in a small watershed area.
- (ii) To test /adapt some interventions with villagers aimed to increase food security and cash income.
- (iii) To understand the dynamics of forest resources and environments
- (iv) To monitor, evaluate changes in livelihood and welfare of villagers
- (v) To build up participatory research capacity of university staff in the field of natural resource management.

2.3 These objectives received the most attention during research:

- (i) Strengthen capability of local people to participate in analysing their situation, identifying constraints, planning and implementing technological interventions.
- (ii) Test/ adapt, by different interest groups, interventions aimed to:
 - * Increase yield and production of wetland rice
 - * Develop home-garden economy
 - * Develop livestock industry (mainly cattle and pig) relying on locally available feed resources
 - * Test some indigenous tree species.

3. Processes followed in conducting research

3.1 PRA training followed by exploratory PRA exercises. PRA is a process to enable local people to exchange their knowledge of life, to learn together and often lead to:

- * Analysing the local situation, identifying the constraints and opportunities to development
- * Identifying the solutions for development
- * Planning
- * Implementing research activities on CBNRM

3.2 The results gained from the exploratory PRA exercises led to network analysis. The analysis showed the main causes/ reasons leading limited food and cash income to be:

- * Insufficient knowledge and skills on appropriate upland farming techniques
- * Limited capital for investment in production

Extension and research works will help to solve the first problem. Regarding the issue of capital, there exist credit facilities; however, there is a need to make them more resource-poor farmer friendly.

Subsequent topical PRAs led to more specific research and development activities. These were carried out by interest groups of villagers and project staff. These activities are:

- (i) Wetland rice: Many trials on testing variety are applied to improve rice breed quality as well as identify the suitable variety for upland area. Production techniques are introduced to farmers.
- (ii) Livestock: Pig breeding is improved by introducing the use of high quality breeds such as the Mongcai. Trials on using local feed resources, eg cassava were undertaken by both lowland and the minority people. Forages were introduced to improve the feed production for cattle in Xuanloc.
- (iii) Home-garden: Home-garden is a production style applied to improve cash income and solve problems of shifting cultivation in slopping land.
- (iv) Forestry plantation: Some indigenous trees are planted to test to adaptation of species.

4. Training and field trips

Staff training:

- PRA training with 22 participants (eight researchers of project from university, two district officers, two researchers from other organization and ten farmers).
- A study visit for nine members of project visited and exchanged experiences with project in College of Agriculture and Forestry in Ho Chi Minh city for one week.
- Trips were made to visit some upland projects of SEARCA in the Philippines and Thailand.

Farmer training:

- Training on SALT technique to farmer in 1 weeks at Phu loc Agro-Forestry training centre for 20 farmers.
- Training on homegarden farming for 20 farmers
- One farmer was trained as a grass-root veterinary technician focussing on animal diseases in the village.
- Field trip to a good area in homegarden production having similar condition of Xuan loc

Workshop/ meeting

- Annual meeting with villagers to review project activities and to get feedback from villagers' ideas
- A workshop was conducted to evaluate project results by villager participation at the end of project time.
- A meeting among projects, GOs and NGOs to share to experiences on how to improve the approach in working with people.

5. Some research results and findings

5.1 Food security and cash income:

- (i) Increase yield and production of paddy rice

Table 1: Change in rice yield and production from 1994 -1996

Variety	1994		1995		1996	
	Area (ha)	Yield (ton/ha)	Area (ha)	Yield (ton/ha)	Area (ha)	Yield (ton/ha)
CR203	24	2.3	23	3.0	2	3.3
IR38	16	2.5	15.5	3.1	20	3.8
IR64	4	2.6	-	-	2	3.7
MT61	3	3.2	10	3.3	2	3.6
CN2	-	-	-	-	24	3.9
VM1	3	3.4	8	3.4	-	-
C47	-	-	4	2.8	-	-
Total	50	125.4	60.5	188.5	50	192

The total area of paddy in Xuanloc is around 50 to 60 hectare. Paddy cultivation is dependent on water supply in each season. The rice yield increased from 1994 to 1996 through the introduction of new varieties and production techniques. In 1994 total rice produced in this commune was only 125.4 tons. In 1996, 2 year later in the same area of paddy, the production capacity was 192 tons. This is about 1.5 times higher than 2 years before. Although this product is not sufficient to the requirement of villagers, it does show that these interventions increase the income of villagers.

- (ii) Establishing home-garden production

As mentioned above, Xuan loc is a new commune of people who have come from different areas in Thua Thien Hue and Quang tri province because of the new economic zone policy. As its location is in a mountainous area, people did not care for home-garden production. Their livelihood is based on the natural resources of the forest. Slash and burn cultivation are applied by both groups of Kinh and the minority people. The forest area decreased and soil fertility also decreased, and farmers realised that their productivity was not as high as before and they had to move very far from house to work.

Home-gardening is an issue that farmers discussed as a solution to solve their problem in farming.

At the beginning of 1994, 12 households obtained credit, training and study visits on how to set up their home-garden. Each family made and designed their home-garden. They also decided which trees they wanted to plant. The project helped them on technical issues. In the second year, 1995, eight more households got support from the project in the form of credit and technical training. The survey in this village in 1996 showed that about 60% of households in this commune followed suit and set up their home-garden.

(iii) Livestock production

(a) Pig production

The Mong cai pig is introduced as sows to produce piglets for villages. The cross-breed of Mong cai and Large White breed grow much better than the local breed as follows:

Live weight gained of pig in Xuanloc

Traditional breed
(local breed)

Improved breed

40-50kg / 12 months

70-80 kg/ 6 months

Women are in charge of pig production. They set up credit schemes for their members. Women have experience in raising pigs, keep and deliver piglets to the poor. More than 100 piglets were produced during two years.

Xuan loc also has much potential for cassava production. In the past, cassava was used as human food, but not so today. Farmers sell cassava root at very low prices. The method of ensilage cassava root to supply feed for pig was introduced to the women's union and 60 % of women members applied this method to produce and store the feed source for their animal. Results showed that cassava root could be stored by ensilage and fed to pigs. The live weight gain from cassava ensilage is higher than the traditional diet of cooked cassava root. This activity is commonly practiced now by farmers and has been adopted by other villages in Thua Thien Hue province.

5.2 Cattle production

(i) Number of cattle kept in households

Table 2: Number of cattle kept in households

Number of cattle/ household	Cattle only		Buffalo only		Both cattle and buffalo	
	No. HH*	%	No. HH	%	No. HH	%
Total HH	79	100	16	100	27	100
1 animal/ HH	2	2.5	5	31.1	-	-
2 animal/ HH	4	5.1	3	18.8	1	3.7
3 animal/ HH	6	7.6	2	12.5	-	-
4 animal/ HH	10	12.6	3	18.8	-	-
>4 animal/ HH	57	72.2	3	18.8	26	96.3

- HH: household
- Source: survey data 1996

Data in table 2 showed that :

- Cattle are kept more commonly than buffaloes
- Almost all families keep more than four heads of animal
- Buffaloes are only kept by households who have a large area of paddy field or use animal power for carrying timber and fire wood

(ii) Growth rate of local cattle at different ages in Xuan loc.

Table 3: Growth rate of local cattle at different age in Xuan loc

Month age	Male			Female		
	Length (cm)	C h e s t (cm)	Live Wt. (kg)	Length (cm)	C h e s t (cm)	Live Wt. (kg)
8	88.7	102.3	87.0	83.5	101.3	80.2
9	84.7	99.0	79.0	80.6	110.9	81.5
10	84.5	103.5	84.1	81.3	100.7	76.6
12	89.0	108.8	98.5	-	104.9	90.2
14	94.0	115.0	116.1	85.2	103.2	88.9
18	91.8	113.0	109.8	92.7	114.4	115.3
24	98.5	121.7	137.2	98.3	122.8	140.4
36	102.5	126.5	153.1	109.0	133.4	181.9

Source: Surveyed data (1996)

Local cattle is small in terms of body weight and size. The mature growing cattle weight is only 153 kg for males and 181 kg for female cattle. Although the number of cattle kept in households is high, the body weight of cattle is low. The economic value of local cattle is low.

(iii) Growth rate of cross-breed (local and Sindhi breeds) cattle in Xuan loc

Table 4: Growth rate of cross-breed calves in Xun loc

Age (Months)	Length (cm)	Chest (cm)	Live weight (kg)
3	70.57	80.85	41.59
6	81.33	97.73	70.13
9	92.50	109.50	99.85
12	99.50	115.50	119.43

With the support of agricultural extension from the province, during 1995 and 1996 more than 200 calves were produced by the cross-breeding method, compared with the local breed. Crossbreds had higher body size and weight. At one year of age, the live weight was 119kg while the local breed is only 90 - 98 kg at the same age. Crossbreds of local and Sindhi are the best way to improve the body weight of the local breed as well as to increase the meat production of cattle in Xuan loc.

(iv) Cattle feeding system in Xuan loc

The cattle feeding practice system in Xuan loc is applied as follow:

- Grazing freely
- Cut and grazing
- Grazing mainly and cut partly
- Grazing - fed rice straw and cut partly
- Grazing and fed rice straw

Xuan loc has potential for pasture. The natural land area for grazing is over 800 hectares, however in recent years, grasslands are decreasing quickly due to planting new forest of Acacia sp. and Eucalyptus.

The fact that the number of animals are increasing and the quality of breed is improving means that animals require more feed. Since the system of feeding is mainly based on grazing and very little supplemental feed supply, cattle production in Xuan loc is facing problems of feed shortage. Farmers realise that in recent years although the number of cattle is increasing, the income from this production is not high. The body weight gain of cattle is low, especially in winter season. Over 200 cattle in Xuan loc died in the winter season of 1996. The weather is cold and feed shortage is the main reason for the death of animals in Xuan loc.

Improved feed production for animals in Xuan loc is necessary. One way is better use of the natural grassland, and the other is to introduce forage species which are suitable to the farming conditions here.

5.3 Natural resources and environment

(i) Forest resources

Table 5: Distribution of family income of villager in Xuan loc

Sources	% of total income
Agriculture crops	39
Forest	31
Home-garden	13
Animal	12
Others	5

The survey conducted in 1996 showed that Xuan loc people earn their living mainly in crop production and forestry. Fire wood collecting, timber cutting and other forest products are an important income source for farmers. But, only families who have male labour could practise these activities.

Data as the change of forest over time in this commune was also collected (Table 6):

Table 6: Loss of forest area in Xuan loc from 1976 to 1996

Year	Primary forest (ha)	Secondary forest (ha)	Total (ha)
1976	-	200	200
1977	-	800	800
....
1991	5	15	20
1992	7	20	27
1993	5	20	25
1994	5	15	20
1995	17	3	20
1996	15	3	18
Total	54	1076	1130

Source: survey 1996 data at People committee of commune

The forest area has decreased quickly since 1976. At the beginning of setting up the village, more forests were destroyed because they needed land for cultivation and material for house construction. In recent years, about 20 hectare of forest was destroyed for timber cutting and tobacco planting. Due to economic development, materials for construction and forests to supply timber were also needed.

Research also collected data on forest species (Table 7). The data was gathered by interviewing farmers who often go to the forests and have experience with different forest species, including veterans who knew this area well during the war.

Table 7: Change in abundance of some valuable forest species

Local name	Scientific name	Before	Now
Kim giao	Podocarpus fleuryi	++	+
Sen	Madhura pasguiery	++	+
Cho	Parashorea sinensis	+++	+++
Truong chua	Nephelium cochinchinensis	+++	-
Go	Sindora cochinesis	++	-
Hueng	Tarrietia javanica	+++	-
Goi tia	Aglaia tomentosa	+++	+
Dao	-	+++	-
Kien kien	Homalonema aramatia	+++	+++
Thach xuong bo	Acous calamus	+++	+++
Mat nhan	-	+++	+++
Ngai rung	Ficus hispida	+++	+++
Chay	Artocarpus tonkinensis	+++	+++

+++ : many

++ average

+ rare

- very rare

Some government projects on planting forests are implemented in Xuan loc. Total land area of replanted forests was 663 ha and planted by Phu loc Forestry enterprise and 227 households of village. Eucalyptus sp. , Acacia sp. are the main species planted. The replanted forest by year shows at table 8.

Table 8: Replanting forest in Xuanloc

Year	Total area planted	Year	Total area planted
1991	29.75	1994	59
1992	143	1995	232.9
1993	198.4	Total	663

6. Lessons learned

6.1 Project staff / researchers have learned how to:

- Closely co-ordinate with local authority
- Strengthen the roles of local organisations in natural resources management
- Collaborate with groups and households in order to carry out the research agenda.

6.2 Project staff / researchers have recognised that local people play a very important role in determining the research agenda such as planning, implementing, monitoring, and evaluating the works of the project.

6.3 During three years of implementing this project on CBNRM the best successes of the project are:

- Enhanced researchers' capability and skills to do community-based research.
- Improved ability of local community to analyse their own problems, to determine their potential, opportunities and to set the development direction for the community. Furthermore, the project has strengthened the roles of local people, groups, organizations in the operation and management of their farming and other daily activities in the locality.

7. Collaboration with other agency donors

- Collaborate with SAREC-FAO in the use of local sources of animal feeds.
- Collaborate with provincial extension in cattle breed improvement program.
- Collaborate with different of faculties of Hue university to do research and training for students.
- Collaborate with FSP program to test the forage crops species based on participatory research method.
- Financial support from Canada Fund to build a dam to tap water for wetland rice cultivation.

COMMUNITY-BASED COASTAL RESOURCES MANAGEMENT

(PHILIPPINES)

By: Marie Antonette J. Menez

Abstract

The community-based coastal resources management program in Bolinao, Pangasinan, Philippines is a participatory research program whereby conceptualization, implementation and evaluation of various activities is a result of an interactive and iterative process between the local coastal community members and the program. The integrated program of activities involves: community organizing, environmental education, livelihood development, resources management and networking/advocacy. The focus of the program is the empowerment of poor coastal dwellers through knowledge and skills development. These enable locals to actively participate in the sustainable management of coastal resources at the village -level and on a broader scale, the entire municipality in partnership with the local government. In the process of facilitation, the program empirically developed a suite of methods and strategies that may be useful in accelerating CB-CRM initiatives. Initial learnings and insights on the appropriate level and scales of action in complex coastal communities; mechanisms to promote the development of community-based institutions for CRM; workability of multi-institutional and interdisciplinary program partnership and the critical considerations in conducting participatory research are discussed.

I. Background to Project

The town of Bolinao, Pangasinan is made up of 30 villages or barangays, 14 of which have coastlines. These coastal barangays contain ~59% of the municipal population (52,701 or 9,944 households as of 1992). Bolinao has the most extensive coral reefs and seagrass beds in province. These highly productive coastal ecosystems are the major breeding and nursery grounds and thus, a critical support system for the marine fisheries of Lingayen Gulf which provide the major source of livelihood of at least 7,500 fisher families. Previous studies revealed that the fishery resources in Bolinao are already depleted due to overexploitation and ecosystem degradation brought about by destructive fishing practices.

The present CB-CRM program is being facilitated by a tripartite partnership between an NGO, Haribon Foundation, Inc. and two academic institutions from the University of the Philippines, Diliman: the Marine Science Institute (MSI) and the College of Social Work and Community Development (CSWCD). In the partnership, Haribon takes the lead in community organizing, MSI in resources management and environmental education while CSWCD is the lead for livelihood development. The overall goal of the program is:

- To develop an integrated program of approaches, strategies and action plans, through an iterative, participatory and interdisciplinary research process, by which a coastal community can evolve into "an active, consolidated and self-reliant community, collectively nurturing and equitably benefiting from sustainable management of its coastal resources, thereby developing a model CBCRM (i.e. more complex coastal communities), that is interdisciplinary and participatory in nature, and applicable in areas nationwide". (Staff Integration Workshop, October 20-23, 1993)

The program activities concentrated on four coastal villages: two on the mainland, Arnedo and Balingasay and two on Santiago Island, Pilar and Binabalian (Fig. 1). Subsequently, other villages within Bolinao and the adjacent municipality, Anda became expansion sites. While the initial approach is village-based, the ultimate objective of the program is to upscale CBCRM for the entire municipality of Bolinao.

2. Research Objectives

- (i) Develop interactive means to mobilize communities towards collective resources management through community organizing and environmental education;
- (ii) Establish participatory mechanisms through which local organizations (LOs) at various levels are legitimised, institutionalized by society and law;
- (iii) Determine and evaluate appropriate coastal resource and environmental management strategies which will ensure a sustainable base of living resources in the coastal area;
- (iv) Identify and develop culturally appropriate, gender-responsive and environmentally friendly sustainable livelihoods that will address the need for food and cash, and which will alleviate direct harvest pressure on living coastal resources.
- (v) Devise networking mechanisms through which efforts on coastal resource management at the barangay and municipal levels are linked to provincial, regional and national levels of governance to achieve maximum viability and impact; and
- (vi) Document the process of evolution toward a community-based coastal resource management program through an interactive learning process between the community and research program, for use in evaluation, training, networking, and application to other coastal communities.

Objectives 1 (subsuming 2), in tandem with objective 3 have been the major interdisciplinary undertakings and have taken up most of the program's time (i.e. direct involvement of majority of the staff) to date. Furthermore, these objectives have been addressed beyond the village level.

3. Research Process

The conceptualization, implementation and evaluation/documentation of specific issues is a result of an interactive (learning from each other) and iterative process between the community (e.g. local organizations (LOs), local government, youth and women groups, local educators) and the program. At the start, more activities were initiated and facilitated by the program through a consultative process with the local community and/or based on existing knowledge of the socio-economic and biophysical situation in the area. As the local organizations became institutionalized, most initiatives emanated from the local community with the program facilitating their ability to take concrete action through additional trainings, providing technical inputs and support (e.g. documentation of meetings, systematic collation of information) and networking (e.g. with funding agencies).

Empowerment of poor coastal dwellers through knowledge and skills development is the major thrust of the program. The interests and needs of this sector were addressed by a variety

of site-based activities (e.g. environmental education sessions, preparation for the establishment of village marine reserves, livelihood development). Interests and needs of other local sectors (e.g. LGU, local educators) were identified through consultations, participatory planning exercises and training needs analysis.

The approaches employed by the local groups and the program in the preparations for the establishment of village-managed marine reserves and the facilitation of the municipal-wide coastal development plan, will be used to illustrate some of the processes utilized by the program. The program activities at the local, regional and national levels regarding the cement plant issue is presented to illustrate the impact some of the program's environmental education, networking and advocacy activities.

4. Training

The composition of the participants and the different types of trainings/exposure trips conducted or facilitated (e.g. by linking with other institutions) by program, in relation to community organizing, resources management and livelihood development are summarized in Table 1. All of the trainings were utilized and effective. These capability building means were instrumental in realizing concrete outputs and actions in various local community undertakings.

4.1 Insights Gained

- (i) The various sectors (i.e. including fisherfolk, LGU and local educators) had very low levels of environmental awareness and lacked knowledge on traditional or conventional resource management but were very eager to learn and share what they knew.
- (ii) Coastal communities are eager to learn new skills particularly those that present opportunities for income augmentation.
- (iii) Participation of the field staff in the different trainings and exposure trips facilitated cross training among disciplines. The shared experiences during these trainings also fostered stronger relationships with local community participants.

5. Research Findings

- 5.1 A multi-pronged approach to community organizing and environmental education are prerequisites to the formation, strengthening and institutionalization of local organizations for CRM.
- 5.2 Networking and advocacy are essential for the realization of CB-CRM objectives in complex coastal communities. Likewise these are the most efficient mechanisms to broaden the impact of the program.

Cross-site activities are effective mechanisms in broadening the perspective of local communities on the appropriate scales for resource management (e.g. village-level to municipal level), and in forging alliances/partnerships. Collective action by these organized

and environmentally aware local organizations catalysed a multi-sectoral and municipal-wide involvement in the development of an integrated coastal resources management plan.

Networking and advocacy at the local, regional and national levels on strategic issues such as the cement plant proposal in Bolinao, facilitated the partnerships among the LGU of Bolinao, other local groups, regional Government organizations and NGOs. More importantly, it provided the context for the active involvement of emerging community-based institutions.

- 5.3 The framework for the development of land-based microenterprises as a mechanism to alleviate fishing pressure on living coastal resources by providing alternative livelihoods for fishermen or preventing others from engaging in fishing (i.e. "resource management tool") needs to be reviewed and clarified.

6. Research issues

6.1 Problems/ Most Difficult Challenges

External Factors

- lack of local government support for the initiatives of local organization's associated with the program primarily due to cement plant issue
- low motivation of the people to help themselves and sustain active participation in the LOs
- prevalence of patronage system

Internal Factors

- working in interdisciplinary groups
- slow response time of Manila-based coordination to immediate concerns in the field
- different levels of commitment of program coordinators and staff for interdisciplinary complementation
- lack of time to address resource/biophysical research

6.2 Enjoining Involvement of LGU

- regular information sharing and dialogues on CRM issues
- solicitation of support and endorsement of program activities
- invitations for participation of LGU representatives in some village consultations (e.g. village marine reserves) trainings/workshops (coastal zoning exercises)

6.3 Policy Outcomes (excluding Cement Plant Issue)

(a) Village level

- approved resolutions for the establishment of village-level marine reserves in three sites

- approved resolution for mangrove reforestation program of LOs in Pilar
- LO resolution to prohibit setting up of fish pens in the adjacent waters of Pilar
- (b) Municipal Level
 - enactment of executive order creating the multi-sectoral technical working group for the Coastal Development Plan (TWG-CDP)
 - recognition (in principle) of the need to formulate an integrated CDP, establish MPAs and regulate fish pen operations
 - identification of the program by the LGU of Bolinao and Anda as a source of technical advice and assistance on matters pertaining to CRM
- (c) Lingayen Gulf Coastal Area Management Plan Commission (LGCAMPC)
 - inclusion of Environmental Education in the Science Curriculum of Region I based on the learnings derived from of the program's Science Teacher's Training Workshop
 - adaption of the principles of participatory, and integrated resources management approaches: establishment of MPAs vs. deployment of ARs; formulation of CDP; regulation of milkfish pen/cage operations
 - identification of the program as a technical adviser to the Commission (e.g. facilitation of community-based CDP in other municipalities, request biophysical research on carrying capacity of Gulf)

6.4 Other Institutional Linkages

- (a) NGOs
 - Tanggol Kalikasan - para-legal training
 - FSSI - livelihood development training
 - CENDDHRA, SAC- funding for livelihood projects
 - Asian Social Institute -CO trainor's training
 - (various other NGOs have visited the program site)
- (b) National and Regional Agencies
 - Department of Agriculture
 - Department of Environment and Natural Resources
 - Department of Trade and Industry
 - National Economic Development Authority
- (c) Academic Institutions
 - Institute for Small Scale Industries
 - (various schools have conducted educational trips in Bolinao)

6.5 Concrete Local Improvements- SUCCESSES

- (a) Empowerment of Coastal Communities towards active participation in Coastal Resources Management and self-reliance
 - functional local organizations and federation advocating CRM

- institutionalization of fishers participation in multisectoral Technical Working Group-Coastal Development Plan
 - prototype land-based microenterprises : paper making; buri making, rice store
- (b) Victory against proposed Bolinao cement plant
- (c) Heightened environmental and CRM awareness (e.g. CDP as a resource management tool) in various local sectors and levels of government

7. Some Lessons Learned

7.1 CB-CRM in Complex Coastal Communities

Village-level CB-CRM initiatives need to be integrated within a broader context.

Networking and advocacy can be facilitated by cross-site activities and the federation of local organizations.

Coordination or partnership with the local government is essential, not an option for CB-CRM.

7.2 Empowering Community-Based Institutions

Education may help understand why management is necessary and may initiate participation, but only actual involvement in resource management activities and concrete results will sustain a program. Local people will normally value these results when they are attained through challenges and collective endeavour.

Collective action of community-based institutions can mobilize other communities and inspire the establishment of other local institutions.

Interdisciplinary effort is essential in organizing and strengthening of community-based institutions for coastal resources management.

7.3 Multi-Institution and Interdisciplinary Partnership

An efficient partnership is extremely difficult to operationalize.

- agreement on approaches, priority activities, etc. and subsequent implementation in the field very slow process
- shortcomings in expected complementation of discipline capabilities and personal commitments (e.g. lack of expertise socio-economics)

It is most efficient to capitalize on the strengths of each team member than to romanticize interdisciplinary work as different disciplines always doing everything together or each member becoming fully cross trained to be able to address all aspects of the program equally. Nonetheless sufficient knowledge and understanding of the basic principles of resources management (i.e. nature of marine environment and resources and resource users) is imperative.

7.4 Participatory Approach and Research

For a CB-CRM program to be effective it has to be adaptive and responsive to arising local needs and issues. The forged partnership between the program and the local communities through the participatory approach, inevitably raises local expectations and warrants a commitment from the program to address concrete local needs. Under these circumstances, it is sometimes necessary to "sacrifice" discipline or program research workplans and targets to ensure that substantial concrete outputs result from the program activities.

Information presented herein is a preliminary assessment of the program based on the perception of the presenter, program reports and inputs from all the field staff and some coordinators.

The overall program coordinator and networking and advocacy component coordinator is Dr. Liana McManus; the presenter and Dr. Porfirio Alino are the coordinators of the resource management component; Mr. Albert Dixon and Ms. Gloria C. Miranda are coordinators of the community organizing component and Prof. Elmer Ferrer is coordinator of the livelihood development component. The program staff are Norberto Estrepa, Serverino Salmo, Elmer Tamayo, Rafaela Borillo, Ronald Castro, Fermin Mesa, Renato Turion, Alexis Yambao, Sheila Marie Antona, Jenevie Anne Ramirez and Vienny Senoc.

INTEGRATED TECHNICAL AND SOCIOECONOMIC APPROACHES FOR RECLAIMING DEGRADED FOREST LAND (REDFOL), CHINA

By: Cai Mantang

Abstract

Integrated Technical and Socioeconomic Approaches for Reclaiming Degraded Forest Land (REDFOL) is a joint research project of the Chinese Academy of Forestry, the International Development Research Centre (IDRC) of Canada and the Centre for International Forestry Research (CIFOR). The general objective of the project is to maximize the sustainable use of scarce resources of the degraded areas for the benefit of rural people through integrated research for the development and application of socially, environmentally and economically sustainable forest production systems in marginal ecosystems of selected regions in China. The basic approach of the project is to create an environment for participatory research in which farmers, scientists and grassroots governmental officials work closely together. This paper deals with the research methodologies and achievements of REDFOL.

1. Background

Integrated Technical and Socioeconomic Approaches for Reclaiming Degraded Forest Land (Reclaiming Degraded Forest Land, or REDFOL for short) is a joint research project of the Chinese Academy of Forestry (CAF), International Development Research Centre (IDRC) of Canada and the Center for International Forestry Research (CIFOR). The four core sites of the project are located in southern provinces/region of China, i.e. Zhejiang, Hunan, Yunnan and Guangxi.

Degradation of forest land is a common issue existing in the study areas due to various reasons ranging from technical ones and non-technical ones. The current project is intended to diagnose problems, design optional packages and deliver packages in an integrated participatory approach.

The general objective of the project is to maximize the sustainable use of scarce resources of the degraded areas for the benefit of rural people through integrated research for the development and application of socially, environmentally and economically sustainable forest production systems in marginal ecosystems of selected regions in China, and strengthen the institutional capacity of the research institutions in integrated rural development research.

In order to achieve above general objective, the following specific objectives were also determined at the beginning of the project:

- (i) to survey and evaluate existing rural socioeconomic and production systems in selected marginal ecosystems of high risk within China, design and deliver technical packages best suited for the adoption of sustainable production systems in varying conditions of each system;
- (ii) to further develop appropriate technologies toward solutions of major land degradation problems, such as degradation of plantation forests, biodiversity conservation and resource use, indigenous species selection for afforestation;

- (iii) to strengthen the research capacity of the project in the fields of socioeconomic studies in integrated rural development and sustainable land use systems through various training programs and studies on contemporary issues in use of degraded lands.

Among the three listed specific objectives, objective (i) is the core of the project and objectives (ii) and (iii) are two support components to the core.

2. The Methodologies and Philosophy

REDFOL's methodologies are organized in a logical framework of integrated approaches for participatory research. The framework, Diagnosis, Design and Delivery (Tri-D) was established with the following basic philosophy:

- Tri-D is recognized as a logical framework of thinking rather than a procedure for organizing project activities.
- The key in Tri-D is to establish a participatory environment for bottom-up implementation of research activities.
- The central players (or participants) in Tri-D are farmers, grassroots level government and scientists.
- Tri-D encourages the combination of modern technologies and indigenous knowledge for solutions to problems.
- The design of Tri-D is trying to provide options (rather than single "optimal solution") in the form of a package (rather than a model one must copy).

3. Project Implementation

The project has a 3-year plan from October 1, 1995 to September 30, 1998. The major research activities in the first one and half year are as follows:

3.1 Organization of Research Team: A multidisciplinary research team was organized in each site for conducting participatory research. The team consists of research scientists from related disciplinary, grassroots government officers and farmer representatives.

3.2 Preparation for PRA: Prior to field data collection, the project conducted the following preparation work:

- Introduction to project framework and training in PRA methods.
- Identification of data needed for the research: According to the proposed research objectives and the basic information of the research sites, each team identified data needed for conducting the research.

- Determining data sources and key informants: For each type of data needed for the research, sources of data or key informants were determined.
- Identification of useful tools: secondary data collection, participatory field observation, semi-structured interview and questionnaire were considered as main data collection methods and, in each method, individual research team determined their own tools for data collection.
- Design of interview questions and questionnaires for participatory data collection: In the process of design the questions, research teams made a couple of trial surveys to test and refine the designed interview questions and questionnaires.

3.3 Participatory data collection: In all the four sites, the following data collection activities were carried out:

- Secondary data collection: the major secondary data were maps (political map, topographic map, land use map, etc.), resource inventory reports, and various statistics in socioeconomic status.
- Participatory field observation: with the participation of key informants in the village, observations were made for collection of information about the natural environment, land use, production activities, and the community environment, etc.
- Household survey: This is the major part of data collection. Semi-structured interviews and questionnaires were used as major methods for data on population, labour, income, production and consumption, production activities, major difficulties and constraints, willingness, etc.
- Group interview: Based on the data collected above, group interviews were organized to get information on the history, natural resources, land use, main constraints, public willingness, etc.
- Other data collection activities: According to available data/information about the research sites, individual research teams have their own data collection activities to supplementary the available data. Those are mainly data in biophysical aspects such as forest resource inventory, etc.

3.4 Participatory data analysis/diagnosis of problems: After sorting out all the collected data, participatory data analyses, or participatory diagnoses were conducted in each site. The objective of the participatory diagnosis was to figure out the potentials and constraints of each site, then provide information for determining the research priorities of each site.

4. Technical Achievements

During the first year, integrated diagnoses of the constraints and potentials in the use of degraded forest land were carried out in the broad context of local socioeconomic development. After identifying the problems and potentials, the project is designing the options for project intervention and technical research. According to the diagnosis report from the four research sites, major problems are identified as follows:

4.1 Socioeconomic issues

- Weak community organizations in forest management.
- Difficulties in accessing market and market information.
- Conflicts between government's development targets and farmers' preferences, and
- Inappropriate economic policies in forest sector.

4.2 Technical issues

- Degradation of plantation forests
- Soil erosion in sloping farming
- Low land productivity due to inappropriate selection of species and lack of improved planting materials, and
- Poor management of plantations of economic plants and timber species.

5. Lessons Learned in the Research Process

The following lessons were learned in the research process:

- (i) About multidisciplinary research team: REDFOL is an integrated research project that investigates both the socioeconomic issues and biophysical issues, so a multidisciplinary research team is needed to achieve such objectives. The most difficult challenge in the project is to gain agreement among the scientists of different disciplines because we all speak different languages. However, after working together for a certain period of time, although we cannot say that we are speaking the same language now, we really are closer and are beginning to have some common words. The most critical common words we have now among scientists from different disciplines are that we all agree that the bottom-up approach is important in CBNRM type research.
- (ii) About participation: One of the most important factors in CBNRM is participation of all sectors involved. Sectors that should participate in a project vary according to different socioeconomic, cultural and biophysical environments. In REDFOL, we emphasize the participation of farmers, grassroots government and scientists.

TARIM BASIN DESERTIFICATION AND WATER MANAGEMENT, CHINA

By: Shi Zulin

1. Research Institutions

- (i) Institute of Techno-economics and Energy System Analysis (ITEESA), Tsinghua University: Modelling, Economic analysis, Data collection
- (ii) Institute of Agriculture Modernization(IAM), Xinjiang Academy of Agricultural Sciences (XAAS): Irrigation system analysis, Rural survey, Data collection
- (iii) Local official agencies charged for agriculture, water management, forests and so on: Data collection and Rural survey

2. Key Local Problems

The symptoms of environmental degradation in the Tarim Basin include:

- (i) Falling river and lake levels
- (ii) Loss of tress
- (iii) Saline soil and alkaline water
- (iv) Pasture degradation and decreasing grass
- (v) Household energy shortage
- (vi) Desertification

3. Research Objectives

- (i) Water management improvement
 - water pricing readjustment.
 - improve water allocation mechanisms and institutions.
- (ii) Water-efficient Farming Pattern
 - develop and adapt irrigation technology to improve water use efficiency and conservation in agriculture production.
- (iii) Economically Beneficial and Bio-environmentally Adaptable Natural Species
 - rationalize exploitation and preservation of bio-environmentally valuable plants.
- (iv) Anti-desertification Strategy for Tarim River Valley
 - rationalize exploitation and utilization of water resources.
 - assess the impact of water use and allocation on economic development

4. Interested Parties in the Project

- (i) The Government of Xinjiang Uygur Autonomous Region
- (ii) The Governments of Prefectures

- (iii) The Governments of Cities and Counties
 - Water and Electricity Bureau
 - Forest Bureau
 - Agriculture Bureau
 - Animal Husbandry Bureau
 - Commission of Science and Technology
- (iv) Farmers

5. The Common Points

- Economic development
- Production increase (grain and cotton)
- Water saving technologies

The Different Points

- Upper stream: not willing to discharge more water
- Lower stream: wish to have more water discharged from upper stream
- Government: wants to raise the water price
- Farmers: don't want water price to be raised

6. Training

(i) Gui Zhou Training

On the Farm Survey Techniques

January 8-23, 1995

Two of our research team members

New rural survey methods such as PRA and RRA

(ii) Overseas Training

On water-efficient irrigation techniques and the cost-benefit analysis method

Two of our team member

May 8 to September 4, 1995

Lethbridge Agriculture Station, Canada

(iii) Training in Beijing

On economic management, water conservation and management

- (a) principles and practice of water pricing
- (b) water-efficient irrigation techniques
- (c) measures and techniques of anti-desertification and afforestation in the Tarim Basin.

Our team members

(iv) *Training in Urumqi:*

On market and environment economics, and water management and conservation:

- The first training was held in Urumqi with ten participants from relevant counties and prefectures for two weeks.
- The second one was held in the four pilot counties for ten days (with an average of ten participants in each place) after the Urumqi training finished; therefore the persons who attended the first one would be the co-trainers in the second one.

(v) *Training for survey and household interview*

This was held in county level accompanied with the second part of the above training program for three days with an average of six persons in each county.

7. Research Findings

(i) For natural resources, such as land, water, forests and energy, exploitation and conservation are important, but conservation is more important.

(ii) The most important thing is the reform of administrative system

The control agency must have its

(a) Responsibilities

(b) Rights

- Water right allocation
- Investment allocation

(c) Benefits

Measures of water management

(a) For the surface water

- quota allocation (water rights)
- control seriously
- rewards and punishments

(b) For the underground water

- encourage people to develop

(iii) Water Pricing
 (a) Water supply costs

Water supply costs for each prefecture (cent/m³)

Region	Oper. cost (1)	Full cost (2)	Full cost (3)	With 6% surplus (4)	With depre. (5)	Present water fee
Akesu	1.34 (1.95)	1.95 (3.17)	2.03 (3.33)	2.89 (5.04)	2.70 (4.68)	0.60-0.66
Bayin	1.46	1.63 (1.80)		1.85 (2.24)	1.80 (2.14)	0.60-1.30
Hetian	1.48	1.99 (2.51)		2.65 (3.81)	2.51 (3.54)	0.30
Kashiker	0.99 (1.32)	2.13 (3.30)	2.22 (3.45)	3.55 (5.78)	3.25 (5.24)	0.45
Yierqiang	1.45 (2.10)	1.94 (3.08)	2.10 (3.40)	3.00 (5.20)	2.83 (4.86)	0.60
Average of K. and Y.	1.26 (1.78)	2.02 (3.17)	2.15 (3.42)	3.23 (5.44)	3.00 (5.02)	

- (1) Operation cost,
 - (2) Full cost with straight-line depreciation, but not including the partial fixed assets formed by farmers' labor input,
 - (3) Full cost with straight-line depreciation,
 - (4) The above plus 6 % surplus,
 - (5) Full cost with depreciation.
- (b) Marginal water supply costs:
- (1) Kezhi reservoir--- additional reservoir water supply: 12.37 cent/m³,
 - (2) Newly development of wells: 6.84 cent/m³.
 - (3) Sprinkling irrigation by self pressure i^a newly water saving: 45.09 cent/m³,
 - (4) Channel seepage prevention for water saving: 5.46 cent/m³.

(c) The average benefit of irrigation water (ABIW)

The ABIWs in each prefecture (unit: cent/m³)

	Akesu		Bayinguoleng		Kashi		Hetain	
	Benef. (a)	Benef. (b)	Benef. (a)	Benef. (b)	Benef. (a)	Benef. (b)	Benef. (a)	Benef. (b)
Grain crops	5.55	7.12	6.12	7.91	5.71	7.65	7.69	10.62
Cash Crops	26.77	38.53	30.51	44.70	34.93	51.12	19.48	28.01
Average	13.55	18.97	16.40	23.42	14.78	21.14	10.50	14.76

* "water benefit (a)" represents the result from the method of benefit allocation;
 "water benefit (b)" represents the result from the method of cost deduction respectively,

(d) Marginal benefit of irrigation water:

Wheat:: 39.88~53.62 cent/m³

Maize: 59.75 cent/m³

Cotton: 158.27 cent/m³

(e) The following principles of water pricing reform must be taken into account:

- (1) the existence and development of the department of water conservancy,
- (2) the endurance for farmers,
- (3) the optimal allocation of water resources.

(f) Five steps for water pricing reform are

- (1) Realize the objective ϕ_1 , self-preservation.
- (2) Reach the objective ϕ_2 , self-remake (a).
- (3) Reach the objective ϕ_3 , self-remake (b).
- (4) Reach the objective ϕ_4 , self-development.
- (5) Realize the real market price

8. Policy Outcome

Water price was raised in each prefecture to the level of the first step we suggested.

9. Difficulties

- (i) Ideological changes
- (ii) Administrative system restructure
- (iii) Investment capital shortage

10. Local Improvements

- (i) Dissemination of water saving techniques
- (ii) Dissemination of anti-desertification techniques

11. Successful Points

- (i) Supported by local governments
- (ii) Data collection from official agencies
- (iii) Farmers' participation

12. Follow-up Project

Sustainable Development in Hetain Oasis in Tarim Basin
Community-Based Natural Resource Management

MANAGEMENT OF BIOLOGICAL RESOURCES IN TAM GIANG LAGOON:

ISSUES, PARTICIPATORY RESEARCH APPLICATION, AND CHALLENGES

By: Truong Van Tuyen

Abstract

The Tam Giang Lagoon, one of the biggest in Asia, is located in Thua Tien Hue province, Vietnam. Natural resource degradation and threats to sustainable livelihoods in this ecosystem result in complex problems in management. The project, established in 1994, was aimed at improving intellectual capacity and interdisciplinary skills for researchers in the Hue region to address the above problems. During the first two-year phase, the research activities were to learn about the systems and management mechanism by using participatory research in an interdisciplinary fashion. First, efforts were made to involve resource users in the research activities and raise their awareness about resource problems and conflicts in management. The project collected data to serve as the basis from which to establish community-based management of biological resources in the lagoon. This paper is to present a new application in approaching participatory research, the most critical issues/problems identified, and challenges for expanding the community-based research for biological resource management.

1. Background

The Tam Giang lagoon, one of the biggest in Asia, is located in Thua Thien Hue province, Vietnam. Its area is about 22,000 ha with a length of 70 km along the coast. About 300,000 inhabitants have settled around the lagoon in a total 236 villages from 31 communes and earn their livelihood by directly or indirectly exploiting natural resources in and around the lagoon.

The project was established in 1994 by a group of Canadian and Vietnamese researchers from Hue University of Science (HUS), Hue University of Agriculture and Forestry (HUAF), Dept. of Fisheries of Thua Thien-Hue Province (DoF), Provincial Department of Science, Technology and Environment, Nha Trang Oceanography Institute, Southeast Asian Research Institute and Hai Phong Institute of Oceanography. The project outline was developed and approved by IDRC and CIDA under the VISED program in 1995. The project started in July 1995 with a PRA training course and exercise in Phu Tan commune. In October, 1995 three interdisciplinary research teams were formed and separated to conduct research in the three research sites selected.

The institutions directly involved in carrying out the project are: HUAF, HUS and DoF. Among a total of 19 researchers (HUAF: 7, HUS: 9 and DoF: 3), there are 4 PhDs, 5 Masters and 11 Bachelors or engineers belonging to the following disciplines: Biology (5), Agronomy (2), Rural development studies (1), Animal production (2), Sociology and Ethnography (3), Fisheries (4), Agricultural Economics (1) and Environmental Chemistry (1). The project is managed by a Management Committee of 6 members. The chairman and the coordinator are both from HUAF. The Management Committee makes final decision on all activities, monitors the budget and holds monthly meetings.

2. Specific Research Objectives

- 2.1 To identify the structure and social organisation of representative communities whose members are active fishers and farmers, including social and gender role of fisher groups.
- 2.2 To identify the groups harvesting resources, species harvested, sites and technologies used, and the amount of harvest by gear, season and location.
- 2.3 To estimate stock and understand crucial ecological parameters of important species in the lagoon, including distribution, migration, spawning, nursery habitats and growth.
- 2.4 To identify local resources management and production, decision-making at the community level, including fishers' selection of gear and allocation and enforcement of use rights to fishing grounds as well as the role of village leaders, commune People's Committee and formal and informal regulations and policies.
- 2.5 To identify the share of aquatic production destined for household consumption and use, household-based processing, direct local marketing, export and the significance of aquatic products to people's livelihoods.
- 2.6 To understand why previous settlement attempts for sampan people have been unsuccessful and to involve these sampan people in determining preferences for livelihood alternatives.
- 2.7 To improve farms incomes and productivity of poor soils especially for selected villages whose households engage in both farming and fishing.
- 2.8 To identify the socio-economic and environmental impacts of aquaculture development in the lagoon including an analysis of conflicts between aquaculture and other economic activities (e.g.: agriculture, tourism, fishing, transport, etc.)
- 2.9 To initiate research to develop methods of sustainable aquaculture production, addressing technological, organisational and regulatory issues.

3. Training Activities

PRA Training was organised at HUAF and Phu Tan commune for 28 participants consisting of 19 project members, 3 members of the Upland resources management project, 4 from Bach Ma National Park and 2 from JIVC. The training course provided the researchers with new methodologies to conduct research and to improve local people's participation into the research activities.

In December 1995, 2 project members attended a 2-week training course on 'Coastal and marine resources management' organised by SEAMEO/BIOTROP at University of Can Tho.

2 project members attended " Festival Workshop on Community-based Coastal Resources Management" (CBCRM) held by the University of Philippines in Dilliman.

1 project member attended a Workshop on "Mangrove Management in Asia" held in Ho Chi Minh City.

Other trainings were organised by the researchers at three research site. These training sessions were on data collection for local research collaborators and the fishers and farmers who participated in the research activities.

4. Process followed in conducting research

PRA was applied at the selected sites at the beginning of the research period. The community groups, facilitated by the research team, identified their problems. However, the level of local participation in planning each research topic varied. Participation was weak for those research topics focussed on basic studies, e.g. aquatic resources assessment, social issues, effects and impact of development strategies. However, participation was higher for those research topics or activities which were oriented towards interventions, e.g. banning of electric fishing, improving land productivity using appropriate cropping patterns; finding alternative income for women.

Different community groups were involved in the research. Though the groups are not distinct and members can belong to more than one group, the list is as follows:

- Government officials at district, commune and village levels
- Fishers: Fixed gear and mobile gear fishers
- Farmers
- Farmers-fishers
- Women
- Aquaculturists
- Sampan people (who live in boats)

The support of local government officials was enhanced by fitting the research activities to local socio-economic development. Establishing a good rapport with local leaders (by soliciting external support to solve some critical problems and needs of the community) produced advantages to improve participation.

Other groups' participation were enhanced by involving them in appropriate research activities. The farmers were involved in the improvement of agricultural productivity. The fishers participated in research into fishery resources, freshwater macrophytes, aquaculture and aquatic resource protection.

Briefly, the process followed in conducting research is as follows:

4.1 Local people, facilitated by researchers, identified their problems, assessed local potentials regarding natural and human resources, proposed research topics and the groups to be involved.

4.2 Researchers with local participants planned the specific research topics. The local people made decisions on selection of participating households, overall content and implementation procedure to be followed. The researchers facilitated the work by providing various options for the participants, thus building their awareness and in developing their insight into every alternative. In fact, the level of the researchers' influence on local people's decision-making varied from topic to topic and also from site to site.

4.3 Implementation of research activities was mainly done by fishers and farmers. It included the following:

- Training and instruction on research design, data collection and recording, and evaluation were provided to the participants regarding specific activities.
- Materials and tools that were not locally available for data collection and recording were provided to the participants.
- Supervision of data collection was the responsibility of the researchers, field staff and/or local research collaborators.
- Materials and resources necessary for implementing research activities in combination with livelihood activities were made available to the households. In some cases, money and gifts were given for extra time that the households took to collect and record the data.

4.4 Continuous evaluation and improvement in the implementation of research. In most of the research activities, continuous evaluation was done by the researchers. The evaluations identified difficulties encountered and positive results. Proposed improvements and changes to contents and procedures were discussed and agreed to with the participants and then put into effect. A lot of improvements were made in research content, type of data collected, and the process in order to adapt the research to local people's knowledge and skills. To improve the reliability of data, other appropriate participants were involved.

4.5 Final evaluation was done by the local people and the researchers. Level of the participation from local people in results evaluation was different depending on specific research topics. The local people were interested mostly in the results from direct interventions and topics focussing on direct and immediate benefits. The researchers also evaluated using their own skills and experience, based on project objectives and on feedback from the local people.

5. Preliminary Research Findings

Three of the most important findings in the project are (1) the diversity of income sources of all local villagers, (2) conflicts between management strategies and groups, and (3) that villagers were able to involve local government for specific CBNRM activities.

5.1 Diversity of occupations

The diversity of income sources of the local people living around the lagoon is high. Generally, there are two types of communities, farming and fishing. Members of farming communities have access to land allocated as rights of land use. Members of fishing communities, including new settlements and sampan people, only have limited rights to public water areas. However, occupations for all are diverse by season and by household member. At different periods in the year, occupations differ and can be described in a very general and simple way as follows:

- After the rainy periods, when soil moisture is high, farmers start seeding and prepare fields for crop growing, fishers fish and aquaculturists raise shrimp and fish.
- The main crop growing season (December to April), which overlaps transition of the rainy and dry season, is a slack period for many poor farmers and a time when they are lacking in food. After finishing the crop growing, they go fishing, doing off-farm activities and selling labor.
- During the dry season, after the harvest, farmers lack work. They become active in off-farm activities such as fishing, working as hired labour or in construction and collecting firewood and grass. The fishers also farm as an additional job: they grow rice in the submerged fields at the edge of the lagoon as a secondary crop (rights to this land is contracted out by auction). Aquaculture, done by both farmers and fishers, is operated mainly in the dry season.
- During the flood season time, from late September to early November, storms, heavy rains and strong winds followed with floods stop people from earning a living. People struggle and suffer with high risks and calamities. It is a slack time for fishers because of the dangers in fishing.

Within households, diversity of occupation results from the following conditions:

- Extremely low levels of income makes people find additional sources by diversifying their economic activities. Fishers and sampan people keep pigs. Some fishers win contracts for the rights of land use for growing rice. Some farmers practice fishing by buying fixed gears complete with the rights to fishing grounds. Many farmers use mobile fishing gears seasonally.
- The transitional process from farming communities and fishing communities to mixed farming-fishing communities has occurred because of a decrease in natural aquatic resources and changes in management strategies. Originally, Trung Lang village of Quang Thai was a fishing community. It is now becoming a farming-fishing village consisting of a mobile-gear fishing group, a fixed-gear fishing group, and a farming-fishing group, the latter of which occupies half of total households.

Dien Truong village of Phu Tan commune was a farming village but it has become a farming-fishing community since it converted agricultural land into an aquaculture and fishing area. Ha Giang village of Vinh Ha was a new settlement of fishers which became a farming-fishing to make better use of local resources. Some land is used for crop production and pigs are raised by most households using local feed sources such as seagrass and waste fish.

Different types of work are generally the responsibility of different people within the household. Migrating workers are mainly the unemployed youth. They work in construction, trade, and clothes manufacturing, etc., outside community. Men and women are responsible for different activities. In fishing households, the men produce rice as alternative work and in farming households, the men fish as an alternative. Women are responsible for domestic animal production and trade of fishing and farming products.

5.2 Conflicts

Conflicts in natural resource management strategies and among local groups have been identified by the researchers. Very simply they have been described as follows:

Agriculture vs. Aquaculture

Conversion of agricultural land into aquaculture area and the construction of ponds in Phu Tan required the destruction of the primary dike for preventing salinity. Though adjacent rice fields were thought to be protected by the highway, acting as a dike, saline intrusion has affected them.

Agriculture vs. Fishery

In the northern part of the lagoon, salinity fluctuation is high. This relates closely to the availability of many aquatic species. The villagers claim that before Cua Lat dike was rebuilt to prevent salt water from leaching into the rice fields, salinity in the lagoon area was higher. Fish catches were higher and some exportable species such as greasyback (in big size) were available. At present these species are not caught.

Aquaculture vs. Fishery

Privatisation of water area for aquaculture (ponds and net enclosures) has reduced the public area available for fishing. This has caused some serious conflicts including damage of aquaculture structures.

Mobile fishers vs. Fixed fishers

In general, water area is considered public access for all fishers. However, fixed gear fishers have rights (though limited) to their own fishing grounds. Mobile gear fishers have very limited rights (limited by time and specific location) in those grounds. Unequal shares to fishing grounds lead to unequal benefits between fishing groups which results in conflicts between fisher groups. Other conflicts occur among fishers because of the use of destructive fishing gear by certain groups.

Farming groups vs. fishing groups

Different groups living around the lagoon have access to different natural resources. The farmers want to fish but in return, refuse to share their land with the fishers who want to practice farming. Fishers want to have land holdings and, as well, compete to gain a higher share of fishing grounds.

Settled groups vs. Sampan groups

The sampan people are encouraged to settle on land but they are not provided appropriate land and assistance because farmers and fishers, already settled, do not want to lose land nor increase their crowded population.

Socially, among these groups conflicts occur as a result of a lack of respect among groups because of differences in customs, traditions and life styles.

5.3 Government Involvement

The Commune government's involvement was solicited by the fishers in an activity to manage fishing resources which was originally identified, planned, organised and implemented by the fishers themselves. This support was very much appreciated. The villagers were accustomed to leaving all responsibility for management to the government. In a case study in Quang Thai, the villagers organised themselves and successfully involved the commune government in a community-initiated ban of electric fishing. Commitment and involvement of the commune government in the activity increased. Initially, when the self-management committee of the villagers was established, the commune PC assisted simply by keeping its security force on stand-by in case of serious conflict or emergency. Due to some difficulties as well as opportunities, the commune security force became more and more involved. The commune leadership took over more and more of the activity because it could not ignore the specific requests from the villagers and, of course, enforcement of laws and regulations is its responsibility. Formerly it did not know how to act in the face of violators and was not aware of the extent of destruction made by electric fishing on aquatic resources.

6. CBNRM Research Issues/Processes

CBNRM research was initiated using different approaches in planning and implementation. Therefore, success varied among sites and also among specific research topics. Based on the level and duration of participation and on the extent of changes made to management, a higher level of success is associated with small scale (village rather than commune or district level), with topics that produced direct benefits and with areas more isolated from large city centers and markets.

The project has tried to involve the local government at three levels: the provincial, the district and the commune (in fact, three project members are from a provincial department). For some specific topics, local government officials were also involved. Involvement of commune government has made important contributions to the CBNRM research, especially for the topics providing direct benefits for local people. Conventionally, involvement of local government is solicited by the interveners (outsiders - researchers in this case). In some of the lagoon project activities, local people also joined in soliciting involvement of the local government which increased its support considerably, especially in the case of the banning of electric fishing.

The project cooperated with government agencies and other donor agencies for specific activities and other community needs. For example, the department of aquatic resources protection cooperated in the community-based ban of electric fishing; World Vision (an international NGO) provided loans for electric fishers (using electricity to fish) who were committed to quitting that occupation; the British Council funded the building of a bridge to integrate the fishing village with the neighboring communities. These activities provided direct benefits for local needs and therefore, enhanced local participation and also improved commitment of the local government towards research activities. Cooperation and linkage with other agencies should be well-planned at the beginning CBNRM research. It is most important that the community is provided with the necessary resources to be able to apply the CBNRM research results and improve critical community needs.

One of the most difficult tasks for the research team has been the planning of specific CBNRM research activities. In general the researchers are not skillful at research planning, a result of their education. Moreover, CBNRM and participatory approaches are new concepts. Poor planning resulted in considerable unexpected problems in implementation.

Making the CBNRM activities sustainable was also one of the most difficult tasks of research team. A CBNRM activity required not only local resources but also external support, such as capital for investment and technical support. However, the research team was not supposed to have access to these resources for the activity.

7. Challenges in Expanding Community-Based Management

The most difficult challenge was to deal with the existing conflicts. It is difficult to plan well and implement the research activities aimed at solving conflict in the system. The researchers are aware of the conflicts; however, they lack the knowledge, skill and experience required to plan and implement activities on building awareness of the conflicts and changing people's attitudes and behaviors. The people may understand the conflicts but they may not implement any changes because these would result in losses to their livelihoods.

The ban on electric fishing was initiated with conditions which made the activity easier to implement. The ban was supported by government law and, especially the provincial government was making efforts to enforce the ban in the province. Therefore the commune government increasingly supported the activity in both dealing with the violators and in protecting the local guards when threats were made against them. As almost all the electric fishers were from outside the fishing community, the ban was mainly against outsiders which meant that all local fishers benefitted equally, or at least

few of the local fishers suffered losses as a result of the ban. Therefore it was easier for the villagers to organize themselves and contribute to the activity.

Further expansion of CBNRM activities may encounter the following difficulties:

- The local government support will likely decrease if the regulation to be enforced is not a government law but based on local rules. Improvement in a community's responsibility and confidence is crucial.
- Future activities may result in losses not only to outsiders but also to some community members. The benefit resulting from the activities may not be equal for all local people; some will gain more and others might lose - at least in direct and immediate benefits. Agreement among villagers and their support might decrease. It is very important to identify the people responsible and capable of running an activity and to select strategies.
- In conditions where there is less responsibility assumed by the local government and less support from part of a community, effective solutions to deal with threats made by uncooperative fishers (locals and outsiders) should be identified as a prerequisite to any further expansion of activities.

8. Lessons Learned from the CBNRM Research

CBNRM is complicated and creates many conflicts. Therefore, besides improvements in community support and participation, government at different levels should be involved to ensure the effectiveness and sustainability of this activity. Especially at the first stage of establishing community-based aquatic resource management, involving local government is crucial for the activity.

The establishment of community-based natural resource management can be successful if the initiative is appropriate. A small scale, specific activity which equally benefits all villagers is necessary for good application. The project gained some positive results in small communities (less 100 households). Our experience in CBNRM has been gained through several small separate activities (e.g. ban of electric fishing, use of peanuts and inter-cropping to diversity farm output and tree planting) which were not integrated into one large system but nevertheless used a CBNRM approach.

The socio-economic conditions in Quang Thai, which is relatively poor, isolated and less developed compared to other communes in Vietnam, made it possible for the farming, fishing and farm-fishing communities to organise themselves towards community-based coastal resources management initiatives. Particularly good results have been achieved from the ban of electric fishing and use of peanut and inter-cropping.

- Fishers and farmers were able organize themselves to solve their own problems or improve income generation.
- The relationship between the fishing community and local government was improved by the fishers' activities
- Some community members were involved in building public awareness for aquatic resource protection in their community as well as in neighboring ones.

- The local government was involved in the enforcement of aquatic resource protection with the fishers sharing the responsibility and contributing their efforts to the ban. The villagers used to leave all responsibility for management to the government however, the local government itself was not able to enforce the ban sustainably without the involvement of local communities.

Disappointments in the CBNRM research approach were in the level of local participation in research topics focussing on basic data collection. The villagers were interested in problems and issues identified and therefore participation was good initially. However it decreased due to a lack of direct or immediate benefits.

The biggest challenge in doing further research on CBNRM is to train field workers to be capable of dealing with equity issues within a community.

COMMUNITY-BASED COASTAL RESOURCES MANAGEMENT IN THE PHILIPPINES: KEY CONCEPTS, METHODS AND LESSONS LEARNED

By: Elmer M. Ferrer¹⁷ and Cristi Marie C. Nozawa¹⁸

Abstract

In the mid-1970's, unmistakable signs of degradation in Philippine coastal environments and depletion of fishery stocks were recognized. In response to this situation, quite a number of projects and programs on Community Based Coastal Resources management (CB-CRM) were initiated all over the country. CB-CRM is a people centered, participatory, and resource based approach that uses participatory, integrated and multi-sectoral processes. The key concepts in CB-CRM include 1) community organizing (C.O.) and leadership formation; 2) participatory research; 3) education and training; 4) resource management; 5) livelihood development; 6) enhancement of cultural integrity and diversity; and 7) networking and advocacy. The experiences have generated a number of key lessons learned for each of these concepts for use in future works on coastal resources management.

1. Introduction

In the mid 1970s, Philippine biologist and conservationists began to see unmistakable signs of degradation of coastal environments and depletion of fishery stocks (Alcala, 1996). In a nationwide study by Gomez *et al* (1981) on the state of Philippine coral reefs only 5% of those areas surveyed were in excellent condition and 75% were in poor to fair condition. Then in the early 1980s social scientists joined in calling attention to the seeds of ecological disaster that have been shown in the Philippine marine environment and called for the undertaking of a community-based coastal resources management, "...a community initiated, run and controlled social organisation as essential instrument in giving meaningful expressions to the views, interests and demands of the rural poor" (Ferrer, 1992).

After almost two decades, the marine environment of the Philippines continues to be degraded and the resources are depleted. However, a ray of hope beacons in the horizon as more and more coastal resources management initiatives are undertaken by non-government organisation (NGOs), people's organisations (POs), local government units (LGUs) and national government agencies either singly or in cooperation with each other.

There are probably over a hundred projects or programs on coastal resources management today and in the recent past. The FSP is funded through a soft loan from the Asian Development Bank while the CEP is funded from the DENR budget.

2. Philippine Coastal Areas Continue to be at Risk

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The 34,000 km of coastline that surround the Philippines' more than 7,000 islands continue to be at risk. Coastal habitats are degraded and the resources therein depleted both directly (i.e. through destructive fishing practices) and indirectly by massive siltation from deforested upland areas and poor agricultural practices and inappropriate land use activities in coastal watersheds.

Most nearshore fisheries are overfished with extraction rates two to three times above sustainable levels. Of the three to four million hectares of coral reefs, about 70% are in poor to fair condition due to destructive fishing practices and siltation. Mangroves have been reduced to about 450,000 ha representing about forty percent of the original cover, as a result of conversion to aquaculture ponds and other uses. This situation is of grave concern to coastal communities and coastal managers as the coasts is where the majority of the people live and work. More than 80% of the country's population resides within 50 km. of the coast of the aim islands.

The fisheries sector contributes significantly to the Philippine economy. It employs over one million people, or about five percent of the national labor force. Approximately 825,000 fishers (part-time or full-time) are in capture fisheries, more than 770,000 of whom are municipal or small scale. An estimated 250,000 are in aquaculture. In addition, another 50,000 people are employed in the service industries-post-harvest handling, processing and marketing, boat-building and equipment manufacture and distribution.

Another cause for concern is the fact that locally-captured fish accounts for about 60 percent of the national protein consumption, making it second to the rice as a staple. A recent Food and Agriculture Organisation (FAO) report indicates that the consumption of fish has dropped from 31 kg per capita in 1987 to 28.5 kg in 1994. Unless urgent coastal resource management efforts are instituted, FAO predicts that the country's fish supply will drop to 940,000 metric tons from the present level of 1.95 M metric tons, and the per capita consumption of fish will plunge to 10.45 kg by the year 2010 when the population is expected to reach 94 M.

Over exploitation of the coastal areas is aggravated by rapid population increase. In 1990, the Philippines had a population of 60.7 M, the ninth highest in Asia and the thirteenth highest in the world. The current population is around 70 million. It is generally believed that a disproportionate population growth is happening in coastal areas. Many of them are landless agricultural workers who migrate to the coast because access to coastal resources is open and at least guarantees survival.

Moreover, legal and institutional weaknesses handicap the implementation of coastal resources management projects. For instance, it is noted that the Philippines has the most comprehensive set of environmental laws in Asia, but few of these laws are adequately implemented. Most of the environmental and resource utilisation issues in the coastal zone are partly caused by non-enforcement of laws. Also, weak coordination and lack of complementarity among related national government agencies mandated to implement CRM project persist. In some cases, government agencies actually pursue conflicting policies. An example is the management of the country's remaining mangroves, where the conservation thrusts of the Department of Environment and Natural Resources (DENR) is in conflict with the Department of Agriculture (DA) aquaculture production orientation. This continuing pattern of decline, degradation and mismanagement of the coastal areas has led to the search for more effective intervention.

3. The Rise of Participatory Approaches in Development Programs

Participatory approaches have become increasingly widespread in development programs in the past decades. In the Philippines, primary health care, communal irrigation development, integrated rural development, marketing cooperatives and communal farming systems, social forestry and until recently coastal resources management are all examples of government and non-government programs that are based on participatory approaches. The increasing concern for participation in development is the result of the failure of previous development paradigms, that generally assigned a passive role to the people they were intended to benefit, to alleviate conditions of poverty and inequality.

In the 1960s, development paradigms tended to focus on capital formation and technology transfer. Most development approaches adopted during the 1950s and 1960s involved a passive role of the majority of the people concerned whose "participation" was limited to adoption of the new technology. On the other hand, decision and policy making were vested in highly trained technocrats and were implemented by nationally organised bureaucracies.

The 1970s was a period of large scale development projects generated from centralized sources, such as central government or international foundations and aid donors. The emphasis was on integrated development packages. The international research centers such as International Institute of Rural Reconstruction (IIRR) are a legacy of this period when information and technology was generated at specialist institutions for application worldwide, while the "Green Revolution" is the best example of an integrated development package. The "Green Revolution" was based on technology developed in laboratory conditions but information, credit, seeds and other production inputs was provided from a central source such as the central government or aid agency, external to the recipients own community. While such programs resulted in significant increases in GNP in some countries, it also resulted in wider gaps between the rich and the poor. By the late 70s, it was evident that the top-down approaches were not delivering the results they claimed they would.

In the late 1970s and early 1980s there was a growing awareness that the problems in development were not simply technological but were also social, political and economic and that these could not only be addressed by using different approaches. Equity and participation reasserted themselves as basic principles in development programs. Thus, there appears to be widespread agreement on the significance of people's participation in attaining development objectives. The "state of the art" literature review by the Cornell Rural Development Committee reported that, "Our overall conclusion is that participation is possible and, under many conditions, desirable to achieve the development goals set by LDC governments and development agencies" (Uphoff *et. al.* 1979). They also concluded that participation is necessary although not sufficient condition for achieving project success. Uphoff upheld this finding in a World Bank study in 1991.

Several international agencies, including the World Bank, USAID and United Nations agencies such as the WHO, ILO, FAO, UNCRD and UNESCO have issued similar mandates for popular participation in their development programs. From these awareness and development skills emerged new methodologies and approaches such as rapid rural appraisal (RRA), participatory rural appraisal

(PRA) methods, farming systems research, and agro-ecosystem analysis and community-based resource management.

4. Search for Participatory Approaches to Resource Management

The past three decades of development in Asia have seen the growing role of central government on the management of local resources (Korten, 1986). Where once the management of small irrigation systems, forest areas, grazing lands, or coastal fisheries was primarily determined by local custom and control i.e. by the people using the resources, today we see a variety of national laws, policies and programs directly affecting communal resources.

However, the past three decades have also seen a growing awareness of the limits of development models that look to government bureaucracies to assume the leadership in doing development work for the people. Governments, in its efforts for modernising and rationalising resource management has underestimated the extent and capacity of the systems by which people have learned through long and often difficult experience to manage locally available resources to meet their own self-defined needs. At the same time the government has often overestimated its own ability to manage these same resources. Government programs have undermined the capacity of people to meet their own needs through local initiative and participation and often times have exacerbated inequities by transferring resources and power from local to national elites while doing little to increase productivity.

One result of this growing awareness has been a search for new and more participatory approaches to resource management. Out of this search has emerged to growing interest in the concept of community-based resource management. Community-based resource management takes as its point of departure, not the bureaucracy and its centrally-mandated development projects and programs, but rather the community itself: its needs, its capabilities, and ultimately its own control over both its resources and its destiny.

5. Government and Non-Government Initiatives in Coastal Resources Management

The increasing concern in coastal resource management is also a result of realisations that rural development can not be land biased. This is particularly true for small islands and coastal communities. Rural development through the years have based their paradigms on land based activities such as agriculture and forestry. For example, even in the delivery of basic services such as health, existing statistics do not distinguish inland and coastal communities therefore information used such as morbidity patterns based on coastal waters are not known. The difference of coastal ecosystems and coastal communities from forests and cropland ecosystems and corresponding communities has made the emergence of specific initiatives directed at coastal communities necessary. The above mentioned history of rural development paradigms is still largely based on agriculture based rural development.

Currently, as mentioned earlier, quite a number of coastal resources management initiatives have been started in the Philippines. Following are brief descriptions of the programs.

5.1 The fishery sector program. This is a five year program intended to reach 12000 fishers in 112 bay areas all over the country. It has six components including: resource ecological assessments; coastal resources management; research monitoring and extension; law enforcement; credit; and infrastructure. Each of this component is handled by a separate agency of the Department of Agriculture. The funds are jointly from the ADB, the Overseas Economic Cooperation Fund (OECF); and the Philippine Government. The coastal resources management component requires the creation of Bay Management Councils as the management body for the area. These councils have multi-sectoral representation. The project also contracts out to NGOs some of the implementation functions such as community organising.

5.2 The coastal environment program. This is the only government program without external support. It is funded from appropriations from the government budget and institutionalised within the DENR bureaucracy. This was created through DENR Administrative order No. 19 in April 1993 in the attempt to place equal emphasis to the protection of marine resources. Its key strategies according to the DENR is community organising; involvement of communities in the protection and management of coastal ecosystems; mobilisation of financial and administrative resources from public and private sectors; and use of contingent approaches in identifying issues, problems and opportunities for human and environmental welfare.

5.3 The GEF-CPPAP and EU-NIPAP. In 1992, the National Integrated Protected Areas System (NIPAS) Act was passed. It institutionalizes a protected areas system that will encompass outstanding remarkable areas and biologically important public lands "to maintain essential ecological processes and life support system...". Each protected area is supposed to be managed by a protected area management board composed of DENR representatives, local government officials, representatives of NGOs, peoples' organisation, including indigenous peoples.

5.4 NGO initiatives in CRM. The map earlier showed around 50 sites of 28 NGOs where CRM is initiated. Most of these efforts are relatively small in terms of area covering from one village to whole small islands. An unpublished study by Buhat, Pajaro and Arciaga summarizes the objectives of CRM efforts of about 40 NGOs and POs in 1995 in the Philippines as follows:

- (i) Building support institutions or groups to promote municipal fishers' rights; they are the most affected sector in the coastal areas and in the belief that the users themselves can best manage their resources;
- (ii) Management of the coastal environment for sustainable use;
- (iii) Economic upliftment and equitable distribution of benefits;
- (iv) Forging partnerships among institutions (GO, PO, academe and with fellow NGOs to improve capabilities and expand services; and
- (v) Linkaging and advocacy for policy reforms.

5.5 Other initiatives. Academic and research institutions also have had separate initiatives such as the efforts of the University of San Carlos in Bantayan Island, Cebu and the joint efforts of VISCA/ESC/UP Visayas in Tacloban for Western Samar. Other joint efforts are underway such as partnerships of research institutions and NGOs; tripartite collaboration- government, NGOs and Pos.

6. The Nature of Community-Based Coastal Resources Management (CB-CRM) Program in the Philippines

The last two decades have been marked by an increasing number of institutions, agencies and organisations which have focused attention on the coastal zone. Acting individually or cooperatively, these groups have evolved unique strategies for addressing the numerous management issues affecting the coastal areas in the Philippines. The various strategies and efforts may be woven into a unified approach often referred to as Community-Based Coastal Resources Management (CB-CRM). This participatory, integrated and multi-sectoral approach is fast becoming an accepted and viable approach to coastal zone management.

CB-CRM is people-centered, community-oriented and resource-based. It starts from the basic premise that people have the innate capacity to understand and act on their own problems. It begins where the people are i.e. what the people already know, and build on this knowledge to develop further their knowledge and create a new consciousness. It strives for more active people's participation in the planning, implementation and evaluation of coastal resource management programs. It involves an iterative process where the community takes responsibility for the assessment and monitoring of environmental conditions and resources and the enforcement of agreements and laws. Since the community is involved in the formulation and implementation of management measures a higher degree of acceptability and compliance can be expected. CB-CRM allows each community to develop a management strategy which meets its own particular needs and conditions, thus enabling greater degree of flexibility and modification.

People's participation in the management of resources also provides a sense of ownership over the resource which makes the community far more responsible for long-term sustainability of resources. With community-shared responsibility for providing adequate resource base for future generations, CB-CRM has greater potential for effectiveness and equity. It can be more economical in terms of administration and enforcement than national centralized systems.

The CB-CRM approach also enhances recognition of and respect for cultural differences on the local and regional levels and among nations. It strives to make maximum use of indigenous knowledge and experiences in developing management strategies and in institutionalising mechanisms. A central theme in CB-CRM is empowerment, specifically the control over and ability to manage productive resources in the interest of one's own family and community. It invokes a basic principle of control and accountability which maintains, "the control over an action should rest with the people who will bear its consequences."

7. Key Concepts in CB-CRM (Components, Methods and Tools)

Approximately three decades of experience in setting up community-based coastal resources management in the Philippines have given rise to key concepts (i.e. components, methods and tools) that guided its development. Like an iterative process it continues to evolve and ground itself in the crucible of experience.

CB-CRM involves an iterative and interactive research process of conceptualisation, implementation, documentation and evaluation involving both the community and development workers/researchers in a dynamic partnership to realize coastal resource management. Throughout this process, the community and the researchers teach and learn from one another. The key concepts revolve around seven major components, namely: community organising and leadership formation, enhancement of cultural integrity participatory research, education and training, resource management, livelihood development, and networking and advocacy.

7.1 Community Organising (C.O.) and Leadership Formation

C.O. and leadership formation is necessary in order to ensure that participation is fostered on a collective basis so that majority of the members of the community if not all, have equal access to decision-making and project benefits. Organisation building is also essential in mobilizing and coordinating the human and material resources of the community in pursuit of their common interests. Community Organising is the basic method for empowering communities to collectively address their needs including the management of their bio-cultural resources. It is problem-solving process whereby the community is empowered with the knowledge and skills to identify and prioritize its needs and problems, harness and mobilize its human and material resources to deal with these problems and take action collectively. It stresses leadership formation and capability-building hence it has also been referred to as a "learning process" approach.

Community organizing lays the foundation for building communities. Through the C.O. process, potential leaders are identified and core groups are formed and later expanded into peoples' organisations. Awareness is further enhanced by environmental education where communities are enabled to think about their economic, political and social needs and problems within a natural resource management framework. Thus, throughout the process of C.O. and leadership formation, the community grows in capability and confidence in building organisations and in institutionalising participatory governance mechanisms in managing its natural resources, in developing environment friendly systems and in networking with other communities, groups and partners to advance its vision and goals.

7.2 Participatory research

Participatory research is the process of empowering the community to re-search its bio-physical and socio-cultural environment to generate new knowledge and understanding which will serve as bases for the formulation of strategy, resource management and livelihood and building confidence in sustaining its efforts towards CB-CRM.

The conduct of participatory research allows the community and researchers to interact in systematically gathering and analyzing data about the former's environment and resources. Together they identify critical problems and begin to formulate solutions. In this way, the community begins to focus on CRM issues and potential solutions as a collective body, gaining insights from their research partners about natural and social processes which they themselves have knowledge and experience on. The researches, through this close interaction with the community, obtain objective benchmark to determine how best to initiate community organising, to prioritize concepts that need to be introduced in environmental education seminars, and to identify what resources and skills are important to livelihood development that community members have or need.

Based on priority problems, the community then identifies initial activities for implementation. The researchers use this as basis for developing their workplans, which also address strategies that better enable the community to undertake the identified activities.

An evaluation of its activity is done as a learning step and as an occasion for consolidation of the community. Assessing both the emerging strengths and remaining weaknesses of the group to implement collective action allows for redefining initial perceptions about goals and strategies to realize them. For communities, a meaningful assessment of their status as managers of their coastal resources determines the degree of commitment and level of decisive participation in subsequent activities.

7.3 Education and training

Education and training is a tool for building consensus on the nature of the problem and the method for addressing it. The educational process begins where the people are. It begins with an appreciation of their given and potential human and material resources including their cultural wisdom. In other words, it begins with the strength and not the weaknesses of the people. The community based approach in education and training is cognizant of the long years of experience of the people and is also appreciative of the values, knowledge, skills and attitudes that the farmers of the land and sea have imbibed in their struggle and unity with humankind, nature and spirits.

Education and training activities are channels through which information and knowledge generated by research are passed on to end users. It is the main tool for capacity building and it can take the form of leadership seminars, environmental awareness, livelihood seminars, and cultural presentations and celebrations. Education and training are aimed at deepening the consciousness and building confidence in order that the people in the communities will actively involve themselves in the resource management efforts. Simple and concrete educational methods like role playing and cross visits often give better results. The main principle is to begin with what the people already know, and build on this knowledge to generate new knowledge and greater confidence.

7.4 Resource management

The resource management component is responsible for evaluating resource use and developing management options which have been identified through participatory research. The component brings together available information on the resources and the areas to determine from a biological and ecological perspective what the best resource management options are. It then brings it back to the community for their validation. This component works closely with the livelihood development component in the evaluation of options. The livelihood development component examines the value of the resources involved, in terms of both market value and family food impact. Resource management may include (but are not limited to):

- (i) Resource inventory and assessment,
- (ii) Habitat rehabilitation,
- (iii) Resource enhancement,
- (iv) Coastal aquaculture, and
- (v) Land and coastal development plans.

The management of the coastal resources maybe done through the formation of resource management councils (RMCs) at the village level which are represented in the municipal councils as provided by the Local Government Code. The RMCs can assist in designing the scope of the management areas and the management plans for the specific areas or resources. The RMCs can take on responsibility for the formulation and/or amendment of municipal ordinances that may regulate entry into the fishery, implement resource-specific management schemes and in general, formulate coastal zone development plan together with the other stakeholders compatible with the principles of sustainable development.

7.5 Livelihood development

The purpose of livelihood development is to reduce harvest pressure while the resource base is being allowed to generate. It is also aimed at cushioning the impact of poverty and responding to the immediate needs of the people. In relation to artisanal and subsistence fishers who are often unfairly blamed for the tremendous pressure on the sea, "reducing extractive pressure" means lessening their total dependence on marine resources and on particular productive activities. This is attained by 1) diversifying the livelihood options of marginalized families so that their basic needs are met through varied sources of income; and 2) facilitating their access to basic social services that can widen the range of socio-economic opportunities available to them. Livelihood development or sustainable livelihood development as would like to call is still in its infancy and would benefit from more experiments. One question that has been raised is, whether CB-CRM livelihood development should be land-based or marine-based or both. Another question is the timing of the intervention i.e. whether livelihood development should be undertaken before resource management measures are in place.

7.6 Enhancement of cultural integrity and diversity

Degradation is not only occurring in the environment. Culture is equally being degraded. Globalization processes in communication and mass media has infused a homogenized, commercialized and materialistic culture. Humankind, nature and relationships are no longer sacred but commodified.

CB-CRM processes can be enriched and enhanced if the cultural wisdom and spirituality of nurturing, caring and sharing relationships among humans and nature and among human beings themselves are reaffirmed and celebrated.

The increasing interests among coastal management practitioners in traditional knowledge and management systems is a good beginning in enhancing cultural integrity. Given the potential of traditional knowledge and management systems to assists in the prevention of environmental and social degradation more research should be encouraged along this line. Gender and ethnic issues should be emphasized to place greater value on their valuable and unique role in resource management. Perhaps, only when cultural integrity and diversity is enhanced can biodiversity and resource management be secured.

7.7 Networking and advocacy

It is not enough that communities set up their community organisations and undertake resource management activities. They must go beyond the small confines of their villages and forge links with local governments and even with national government, other sectoral organisations and academic, research and financial institutions to bolster their efforts at bringing about a community-based coastal resource management. Networking is a method for building support groups. It is a way of bringing together the scattered expertise of individuals and institutions to help resolve particular problems.

Advocacy is a mechanism through which organized groups and communities institutionalize their goals in policies and laws of other groups and higher levels of governance such as the national government. Networking is therefore a prerequisite of advocacy. In both phases, an organized community reaches beyond its confines to help and learn from other communities and groups and together effect significant policy changes.

8. Lessons Learned

8.1 For community organizing and leadership formation

(i) *Community participation is crucial to CBCRM:*

Direct participation of community partners in program planning and implementation has been lacking in most government projects. CB-CRM experiences in the country has shown that without community participation, a program is bound to fail. But participation is not enough, for CB-CRM program(s) to be successful, a community must be organized and its social and environmental consciousness heightened by leadership training and environmental education.

(ii) *CB-CRM must show results and concrete benefits to the community early in the program:*

Accomplishing concrete gains in a project is the most effective mechanism to convince people about the relevance of a CB-CRM program. It is a key factor in mobilizing commitment and participation thus, the sustainability of a project. Volunteerism and community participation should sustain activities at the local level.

(iii) *Empowerment of local communities is critical to CB-CRM:*

In the few recorded successful initiatives in the Philippines, the ability of communities to decide on how they manage their resources was critical in ensuring that this communities interest and participation continued beyond the project's lifetime. Are government agencies effective in community organizing? Can government who basically holds the power facilitate effectively a process that will in effect result in government sharing or relinquishing its powers directly to local communities? This may be the underlying reason why most of the government programs are characterized by weak implementation; lack of credibility, capability and commitment; and non-priority of CB-CRM by local government units.

8.2 For research

(i) *No component of CB-CRM can work in isolation:*

Coastal management should be integrated and community based. The core unit of program implementation is the community. Reliable information from research must be used for community planning, program or project implementation, monitoring and evaluation. In CB-CRM, research can not be for research sake. Research becomes part of a whole process. By undertaking research, expectations are raised and this can not be avoided only minimized.

(ii) *Knowledge production must genuinely involve the members of the community/ the stakeholders:*

In government programs, information gathering has been weak, untimely and in an unpopular form. Information generation must be sustained and can in themselves contribute to ensuring the sustainability of the project's impact.

8.3 For education and training

(i) *Leadership formation and environmental awareness are crucial elements in CB-CRM:*

By building more local capacity, the tendency towards dependency on the intervening institution is lessened and prospects for sustainability of CB-CRM is greatly increased. Leadership not based on personality and political favors is important to reflect the type of leadership that is responsible and accountable to the local community first and foremost.

(ii) *Value reorientation of local government units is critical and urgently needed to redirect their political will in favor of community based coastal resources management:*

If empowerment is important to CB-CRM and sustainability is to be attained, local government officials have to have longer term perspectives in development. In the Philippines, local government officials have maximum of two 3-year terms. Currently local development is only now being realized with the enactment of a local government code in 1992 and development planning is still new for local governments. CB-CRM may be seen as a threat to this newly acquired power.

8.4 For resource management

(i) *There is a need to review or evaluate the effectiveness of habitat enhancement technologies as coastal management tools:*

This is particularly true for the use of artificial reef, mangrove afforestation and marine sanctuary formation. The use of artificial reef is so widespread that it is now being used as a means of disposing off "garbage or junk" such as used cars and equipment. The interaction between artificial reefs and marine sanctuaries also need to be evaluated. Evaluation should not only cover the biophysical but also its interaction with socio-economic, political and cultural concerns of the community.

8.5 For livelihood development

(i) *CB-CRM should contribute to improving livelihood:*

Livelihood is not just confined to production activities. It is also a means to provide sustenance, shelter, education, health, spiritual and aesthetic satisfaction. A stable livelihood at a certain level at which basic need is met is significant in contributing to the project success.

(ii) *Livelihood activities must not be used as come on for community participation:*

Generating community participation on the basis of prospects for involvement in livelihood initiatives is a weak basis for sustainability. This concept must also learn from past development debacles and avoid resulting into dole outs for the community. Dangling the prospect of credit, financial benefit is contradictory to organizational development and building the self-confidence of local communities. Dependency on the so-called source of the alternative livelihood is built.

8.6 For networking and advocacy

(i) *Community-based initiatives need outside linkages and support:*

National development agenda such as national energy plans or national mining policies may have great implications to the continued implementation of CB-CRM. Any achievement at the local level can be adversely affected by one single national decision. Issues at different levels of society (national, regional and local) should be considered by CR-CRM. Vertical and lateral linkages including those with academe, NGOs and Pos is important to ensure integration and non-duplication of efforts.

(ii) *Law enforcement is vital to coastal resource management:*

Policies may be in place but require collaborative and credible efforts for effective enforcement. Local political favors play a major deterrent in the enforcement of environmental policies.

SOCIAL RELATIONS IN CBNRM: TAKING STOCK OF GENDER AND CLASS

DIFFERENTIALS IN COMMUNITY RESEARCH

By: Josefa Francisco

1. Introduction

Social research has long ago recognised the value of examining how the differential interests of and relations among various social groups (people) affected life processes and opportunities for human well being and development . A central concern of such studies has been to analyse how one group's location in the social hierarchy affected its members' life options or their capacity to decide for themselves and to gain personal security. It is generally accepted, for instance, that groups who comprised the "economically poor and politically dis-empowered" category had less options and control over their destiny. Moreover, researches have shown that the "poor" did not only suffer from lack of material resources but suffered, as well, from various forms of social discrimination and control from other social groups that were considered "economically rich and politically powerful". If one were poor, one was, also, very often regarded as "ignorant" or "un-civilised". Far from being neutral, social differences historically functioned as organising forces that bred social hierarchies, inequalities, domination and hegemony. It is against this backdrop that many researches on sustainable development are strongly concerned with issues of people's participation & empowerment, social justice and cultural pluralism.

The "rich-poor" divide (class system) remains a powerful organising force in our daily lives and should continue to be factored into our research agenda and designs. New paradigms, however, are enabling us to understand that social inequalities, as had been thought of, have not been determined singularly by differences in capital accumulation and wealth but rather emanated from the complex interaction of various forms of social divides and discrimination. These new ways of analysing social reality are telling us that to be poor and dis-empowered is to be located at the nexus or web of interconnected social conditions and forces. One of the most staggering of realisations in this regard, has been the recognition of the gender system as one of other equally powerful social conditions and organising factors in our lives today (others being race and ethnicity).

Our focus on communities in the current project on sustainable resource management provides us with an excellent opportunity for analysing the diversity of social relations at a realm where people co-exist and co-operate with one another for survival and development, and are linked with each other along certain shared rules and practices. Moreover, such a community or set of communities, is found within a specific geographic and biophysical eco-system, with set boundaries and delineation. All of these provide the researchers with clear parameters for examining a complex set of social relationships and human actions as these relate to sustainable resource management.

practicable a group of people can respond to needs and demands arising from human interaction with the environment, at a particular historical juncture. However in many cases, despite a change in the prevailing conditions, certain ideas and practices associated with past conditions, continue to persist in the society as a tool, for instance, of social control and domination by a powerful social group. Such ideas and practices related to gender relations may be found in official political edicts, formal knowledge, myths, education and the media. This is the situation referred to by the concept of gender stereotyping. To illustrate: women through time have been involved in productive work yet ideas, such as, "women are only good for the house" or "big problems and solutions require men" are still widespread in many areas today.

By adopting the concept of gender division of labour or GDL, researchers are prompted to take social accounting of the actual tasks and activities performed by groups of women and men, and from this identify problems related to access to resources. More than this, however, an Expanded GDL (Naila Kabeer/IDS 1994) forces us to take stock, as well, of prevailing social rules on and practices of women and men, to understand the rationale for the prevailing distribution of tasks and activities are accessed/ not accessed by groups of women and men. Moreover, an Expanded GDL is able to pinpoint relational areas/sphere, processes and mechanisms where exclusionary prescriptions and processes to some social groups of women and men make it more difficult for them to access certain benefits, opportunities and resources that will enable them to co-determine the achievement of collective (household, community, society) welfare, security and autonomy.

3. A Gender, Environment and Development Perspective

This section discusses what I refer to as a gender-fair community-based natural resources management research framework. The framework is still conceptual and is informed by and heavily drew from three earlier efforts at clarifying gender analysis and/or gender as it is a factor in sustainable development. These are the following:

In a 1994 workshop that was jointly sponsored by the Gender and Development Programme (GAD) of the Asian and Pacific Development Centre in Kuala Lumpur, and The Summer Institute for Gender and Development at St. Mary's University and Dalhousie University in Halifax and funded by the IDRC and the CIDA Regional Programme of the Canadian High Commission in Singapore, a group of researchers in South-East Asia discussed the broad elements of a research framework that takes on board the concerns for gender, environment and development. From out of this workshop arose the GED or Gender, Environment and Development framework which became a cornerstone concept for Engender's publication of a book on gender and the environment which was co-authored by Dr. Vivienne Wee and Dr. Noeleen Heyzer.

The second influence is the DAWN analysis and critique of dominant paradigms of development. DAWN or Development Alternatives for women of the New Era is a global network of women research activists living in the South that promotes a southern feminist critique of a macro-economic development. The ideas of DAWN are found in the more popularly available works of Gita Sen, Peggy Antrobus, and Devaki Jain. Finally there is the ongoing work the Social Relations Framework of Dr. Naila Kabeer and her colleagues at the Institute for Development Studies/Sussex,

a gender analysis framework which was preliminary expounded in the book *Reversed Realities* and is currently being tested primarily in India.

The simple and as yet preliminary research framework features the following premises:

- (i) People are differentiated and a major differentiation is that of women and men as these identities and their relationships are constructed by the gender system. In actual operation, the gender system influences women's and men's lives in interlocking fashion with other social forces or circumstances, such as, class, ethnicity, race, and age.
- (ii) Due of the prevailing gender system(s), groups of women and men interact with the environment differentially and are, also, impacted differentially by the environment. Due to the differences in their assigned social tasks, activities, roles and obligations, groups of women and men would have differences in the how they perceive, use and manage resources within the environment. In factoring gender into resource management systems, it is important to get the experiences and view of various groups of women and men in the same social group.
- (iii) Social tasks, activities, roles and obligations of women and men located within what DAWN refers to as the production-reproduction continuum. Individual, household, community and society welfare and development is not just about increasing production (economics) but equally encompass the spheres of nurturance, food security, health, and spiritual regeneration. The dominant perspectives undervalue the social development side of development as these lay stress on market-driven growth models and linear relationships among states and peoples.
- (iv) Both the household and the community are institutional sites where sets of rules and practices influence the way groups of women and men are able to exercise their ability to decide autonomously and agree/disagree with one another in the co-determination of the goals of the household and the community. In some instances, a community may consciously promote a set of values that give equal participation to women and men but this may not be the case in certain household where the dominance of the husband is unquestioned by the rest of the family members.
- (v) In conducting research on the relationship of gender/class systems/dynamics to environmental use and management, it is necessary to look at two areas: (1) the actual allocation of tasks and resources within the production-reproduction continuum, between groups of women and men and between women and men within the same social group; and (2) set of rules and practices influencing how groups of women and men and women and men in the same social group use and manage resources. Some tasks and activities are carried out either individually or jointly by women and men while certain rules and practices may be weak or strong in terms of how these influence access to resources and resource management by women and men in the community.
- (vi) In the context where resource depletion and competition is a critical concern, the roles, processes and mechanisms used by social groups of women and men within communities in

resolving conflicts and practising restraint on resource exploitation is crucial. It has been found out that across several resource bases, communities have exercised prudence in resource exploitation and in the process have given up certain ongoing short-term benefits for more sustainable prospects.

- (vii) Development intervention which includes research is considered an outside intervention into the community. As such, the organisational analysis of these interventions in as far as their gender relations and perspectives are concerned, is deemed crucial in any gender-fair undertaking. For instance, some exogenous gender stereotype views may inadvertently be carried into communities and in the process strengthen emergent or weak gender biases and inequities within.

4. Implication of Framework to our Research

- research conceptual design
 - analytical tools
 - research questions
 - schematic models
 - domains & dimensions
 - variables
- new data needs
 - data on reproductive work
 - data on social relations between social groups of women and men
- data gathering techniques
 - entry
 - choice of key informants/respondents
 - data gathering tools
 - data gatherer/researcher
- data analysis
 - quantitative & qualitative
 - social and natural sciences
 - multi disciplinary/integrated
- research recommendation
 - address issues arising from gender differentials that lead to hierarchies/ inequalities
 - mainstream gender
- research management
 - expertise/specialisation
 - team's awareness of gender issues

5. A Final Plea: Why Gender in CBNRM Research?

- (i) Women and men are linked to the resources differentially:-
Bringing in the perspectives of both woman and man provides a holistic understanding on the value of resource base to the community.
- (ii) Women and men have cultivated ecologically sound and effective techniques in resource management, individually and/or jointly:-
Women and men will contribute to the identification and testing of project approaches, strategies, techniques in NRM.
- (iii) CBNRM demands the active participation of all members of the community:-
Women must not be excluded from processes of consultation & consensus building.
- (iv) Alternative NRM approaches will need to draw from the visions, ideas & aspirations of social groups that have been marginalised by dominant approaches/paradigms:-
Poor groups of women and men comprise these marginalised groups.

It is hoped that the foregoing, together with the case studies and the papers that had been distributed, will prompt us to re-examine and re-think our premises and design in research for CBNRM and to surface the critical role that gender considerations play in efforts toward CBNRM.

RESOURCE MANAGEMENT POLICY IN

RATANAKIRI PROVINCE, CAMBODIA

by: Nhem Sovanna

1. Background

Ratanakiri is the northeastern most province of Cambodia bordering on Laos to the north, Vietnam to east, Stung Treng province to west and Mondulakiri province to the south. Ratanakiri is characterized geologically by forest, upland plateau (mainly basalt) and demographically by having a population of almost 85% ethnic highlanders. In 1995 the Department of Environment in Ratanakiri province identified 11 sites for environment protection and tourism. Yeak Laom lake is one of them. The boundary proposed encloses 5063 hectare of land itself.

Yeak Laom commune is comprised of five villages consisting of over 300 families of the Tampuan ethnic group. These people practice shifting cultivation and live in close harmony with the forest from which a significant proportion of their natural resources are derived.

Development pressures in Ratanakiri province are straining both the local communities and the environment which surrounds them. These pressures are particularly true for Yeak Laom commune as it is situated directly adjacent to the commercial and administrative center of the province Bun Lung. The Royal Government of Cambodia is interested in continuing development in the province and has stated its commitment to do so in a way that can ensure conservation of resource and culture.

IDRC/RMPR, the Ministry of Environment, Provincial Department of Environment, Agriculture, Tourism and Culture, District and Commune officials and local communities, have collaborated in research to determine important issues and identify problems in the community which might be useful to local government and indigenous people in the area to sustainably manage their natural resources.

Resource Management Policy Ratanakiri Province (RMPR) is the sub-project of IDRC which focuses on ethnic hilltribe communities in Ratanakiri province. Through the RMPR project, IDRC has liaised between the provincial government and an ethnic community comprised of 1500 indigenous people in order to encourage the sustainable development of the community NR's and hoped that the RMPR project will serve as a model of sustainable NRM that will eventually benefit other ethnic community and the province as a whole.

1.1 Research institutions involved

Due to lack of research institutions in Cambodia IDRC has taken on role of project implementor.

1.2 Key local problems which led to project

The key local problems which led to the project implementation are: unsustainable resource management in a newly established protected area due to encroachment of land by outsiders, previous and present deforestation, resettlement, land degradation, pressure to develop tourism in the province and changing cultural values as a result of increasing exposure, and influence of the permanent society.

2. Specific Research Objective

Our specific research objective is to develop Yeak Laom commune as a model of protected area management and sustainable community-based natural resource management (NRM).

Included in this research programme are:

- Equitable land tenure systems.
- Improving agricultural productivity and sustainability.
- Developing a community-based resource management plan, including livelihood opportunities such as eco-tourism.

2.1 Research activities which took most time and effort:

- Investigations in land tenure and customary land use, as well as resolving land encroachment including boundary issues.
- Activities contributing to the establishment of the Cultural and Environmental center, specifically, research from September 1996 to January 1997 into traditional handicrafts throughout the province as well as the collection of artifacts.

3. Process Followed in Conducting Research

3.1 Identification of problems

- Provincial government, community groups, research team.

3.2 Community groups involved

- Farmers, agricultural chiefs, village leaders.

3.3 Interests and priorities of different groups

- Conflicting interests between development of a tourism area for attracting revenues, and development priorities of local villagers.
- Activities concentrated on tourism development to satisfy political requirements.
- Community resource management activities including agriculture only starting to be addressed.

3.4 Gender

- Secondary idea - extensive gender analysis research already done in one of the target villages.
- Extensive socio-economic survey being done in two of the other villages (IDRC/CARERE).
- Result of the socio-economic survey not yet completed but can be used for research work on livelihoods development, agricultural processing and labour saving technologies.

4. Training

4.1 Kind of training

- On the job training with local government counterparts and community representatives - including mapping, preparing and conducting surveys, cultural and socio-economic research, report writing and protected area management.
- Agricultural development technologies with farmers and village leaders.
- Community forestry/NRM: PRA, planning, extension techniques (not yet conducted) for research team and villagers.

4.2 Effectiveness of training

- Agricultural trials are being set up for this season - interest has been created.
- Local government counterparts increased ability and understanding of issue, becoming more participatory.

5. Research Findings

- High levels of production of crops such as bananas, papayas, other fruits and vegetables.
- Low level of dependence on the market economy.
- Problem of land insecurity and lack of awareness among villagers in terms of their vulnerability with respect to land tenure, NRM, and tourism.
- Despite increasing land insecurity, there is a commitment to protection of remaining forest and other NR's, but lack of techniques to do so presently.
- Cultural traditions with respect to handicraft production are being eroded for either reasons of close proximity to the commercial center or degradation of environment.

6. Research Issues

6.1 Difficult tasks

- Bringing the cultural gap between local government workers (Khmer) and local villagers (Tampoun).
- Cultural gap means problems with communication with some members of the community women.
- Appeasing provincial government need for tourism development and trying to ensure community management. Community management aspects are only now being addressed.

- Being rushed by provincial government before having established community presence.
- 6.2 Involvement of local government
- Research team includes representative from key local government departments.
 - Too many government representatives were taken on at the start This has exacerbated the problem of intercultural communication.
- 6.3 Improvements
- Less government staff; including more community members, more women.
- 6.4 Policy outcomes
- IDRC has been supporting and working closely with the Cambodian Governments' Interministerial Committee on Highland People Development (IMC). Seminars and research on land tenure have been instrumental in formulating the Cambodian Government's Draft Policy on Highland People.
 - Assisting with awareness raising of indigenous people rights through the IMC draft policy on Highland people.
 - Assisting provincial governor (ongoing - no concrete result as of yet) to develop ways to control concessionaries that will be operating in the province in the near future - EIA, land use and land tenure regulations.
- 6.5 Reaching policy makers
- Personal interest shown by the governor of Ratanakiri.
 - Conducting seminars that allow local people's concerns to be heard:
 - Seminar on sustainable development of the northeast of Cambodia.
 - Seminar on land titles for highland people (cooperation with Non Timber Forest Product Project).
 - Community representation at the Highland People Programme Regional Workshop.
- 6.6 Research coordination
- Close cooperation with UNDP/C/RERE Ratanakiri project - Socio-economic survey hydrology assessment - natural resources assessment of northeast Cambodia.
 - Cooperation with Cambodian Environmental Management Programme (CEMP).
 - Cooperation with UNESCO with respect to research on village women's cotton weaving tradition.

6.7 Providing for community needs

- Cooperation with CAREERE's community development activities.
- Setting up sales of community handicrafts.
- Distribution of plant material for agricultural trails (ongoing).
- Brought the issue of security of land tenure to the forefront at the community level as well as the government level.
- Assistance with tools for small scale dam building, some drinking water- improvement (well construction) carried out.
- Negotiation into protected forest boundary (almost complete) with associated regulations (ongoing).

7. Lessons Learned**7.1 What would we do differently:**

- Start smaller and slower.
- Concentrate on involving the community.
- Focus our objective and/or activities.

7.2 Successes

- Built good relations with government and the community as a solid base for future work.
- Established a tourism development area, including set up a cultural and environmental centre, that has been well received by visitors.
- Helped create some environmental awareness among the general population.

7.3 Disappointments

- Not enough concrete benefits to the community yet.

7.4 Main questions that need future research

- Indigenous natural resource management systems, understanding how they work (forestry, agricultural and religion).

7.5 Biggest difficulties for doing further research

- The fast changing pace of development in this area means options identified during research can quickly become out of date. Example due to land encroachment, decisions made at provincial and national level etc.
- Local people are reaching research overload and want to see concrete benefits as a result of all this research activity.